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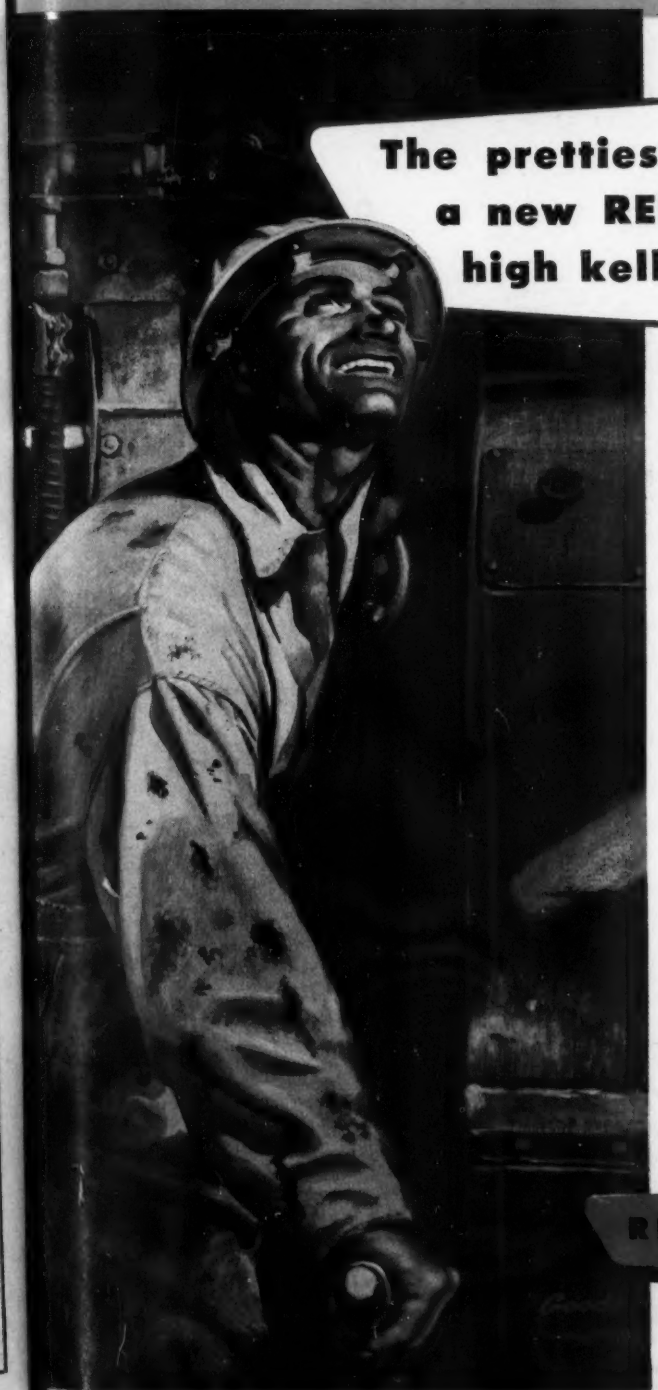

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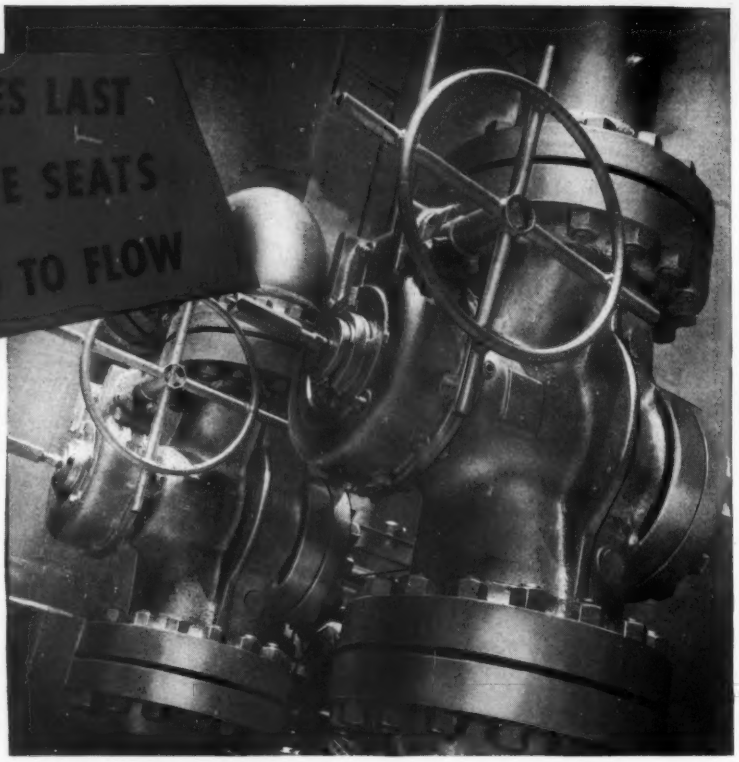
NORDSTROM VALVES LAST LONGER BECAUSE SEATS AREN'T EXPOSED TO FLOW



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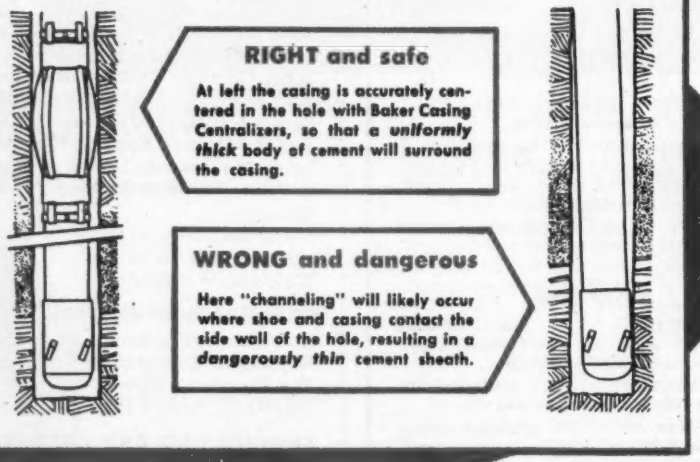
RIGHT and safe
At left the casing is accurately centered in the hole with Baker Casing Centralizers, so that a uniformly thick body of cement will surround the casing.
WRONG and dangerous
Here "channeling" will likely occur where shoe and casing contact the side wall of the hole, resulting in a dangerously thin cement sheath.

It's easy to start right

Just get in touch with the Baker representative nearest you for competent assistance in determining where Baker Casing Centralizers should be installed. They are quickly and easily spot welded on the casing by following simple directions given on the tag attached to each Centralizer. — And you then know that you are "well insured" against danger or failure when the cementing job is performed.

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THE OIL AND GAS JOURNAL

Half-Billion-Dollar Search

IN Denver this week more than 2,000 executives and scientists are meeting to report on progress in the most extensive and intensive search for oil that the petroleum industry has ever known.

Members of the three organizations presently holding their annual meetings have the major domestic responsibility in spending well over a half-billion dollars this year for geological, geophysical, logging, and wildcat-drilling operations. This estimate does not include lease and rental costs.

While there are uninformed outside observers and politicians who insist that not enough is being done in finding new oil to supply mounting world demands, they will realize how inaccurate and unfair their criticisms are if they study the reports presented at the Denver meetings.

Currently, Journal data show that despite unfavorable weather conditions 1,320 wildcat tests were completed the first quarter of this year, an increase of 13 per cent over the first 3 months of 1947 and 42 per cent over 1946. Operators will carry out their early January forecast of 6,300 exploratory tests this year if equipment and materials are available.

As to results, the activities of explorationists and engineers explain the amazing increase of more than 600,000 bbl. daily in domestic daily crude-oil output this year over the corresponding period of 1947. Additions to proven reserves in 1947 constituted one of the largest yearly gains.

Most consumers and many within the petroleum industry have no conception of the scientific accomplishments of more than 8,000 professionally trained geologists and geophysicists. Geophysicists are electronics experts as a phase of their regular job. They have instruments that record from the air, on the ground, over water, and in drilled holes. Geological departments are one of the largest users of aerial photos and maps. Radioactive devices for oil-logging formations in wells were being used before work on the atomic bomb started. Radar is now in common use as a surveying instrument.

New knowledge and new tools will enable petroleum's explorers to continue extending existing fields and to find oil in substantial quantities in areas previously condemned. Geologists are contributing an essential part in the increasingly important secondary recovery operations.

At scattered points throughout the world new oil reserves are being found. Within this continent several new oil provinces are in the early stages of exploration and development. These include the Continental Shelf along the Gulf Coast, the Canadian trough in Western Canada, and the corner section of Arizona-New Mexico-Colorado-Utah.

There are many remaining oil frontiers in areas and in scientific attainments leading to new discovery practices. Given adequate support and left to their own devices, petroleum's seekers of additional oil supplies will continue their record of the past as the front line of expanding operations.

PETROLEUM—A *PROGRESSIVE* INDUSTRY

Increase in Domestic Production Essential, I.P.A.A. Directors Told

by C. O. Willson

WICHITA, Kans.—Domestic crude-oil producers must expand their output 150,000 bbl. daily by summer, directors of the Independent Petroleum Association of America were told at their 2-day annual meeting here April 26-27. This projection of domestic crude-oil output was part of a report of the association's economics committee, of which C. P. McGaha of Wichita Falls, Tex., is chairman and H. B. Fell, Ardmore, vice chairman.

The committee estimated daily crude-oil demand at 5,490,000 bbl. for the second quarter and 5,580,000 bbl. for the third quarter, the latter figure being approximately 150,000 bbl. daily greater than the present average output. For the second quarter the committee estimated production of natural gasoline and associated products at 400,000 bbl. daily and imports 460,000 bbl. for a daily average total, including crude oil, of 6,350,000 bbl. In addition to the increase in crude-oil output it was estimated that production of natural gasoline and related products would increase to 410,000 bbl. daily the third quarter with imports increasing to 480,000 bbl. resulting in a total demand of 6,470,000 bbl. daily for the third quarter.

It was explained that this projection of operations for the third quarter if carried out would provide for the following increases in domestic consumption over the same period in 1947: Gasoline, 9.4 per cent; kerosine, 12.8 per cent; light fuel oil, 18.5 per cent; heavy fuel oil, 2.4 per cent, and all other products, 12.6 per cent.

The economics committee report was one of several submitted at the semi-annual meeting dealing with various phases of the present oil outlook. In addition to association business several prepared talks dealing with public relations, economics, and secondary recovery were presented. The meeting was largely attended by directors from all parts of the oil country.

Majors Criticized

Since last fall 14 committees and subcommittees have conducted hearings at Washington, Russell B. Brown, general counsel of the association explained, and these hearings required a total of 180 days. These investigations in part reflect the fact that the public has been misled and is confused as to the domestic oil situation, Brown contended, reiterating his often-expressed views that large oil companies with foreign oil properties and government officials who desire to obtain control of the oil industry are responsible for existing conditions.

"I do not need to further elaborate on the effect of this propaganda," Brown said. "There is no other industry that has so clear a record of faithful service in war and in peace as does the petroleum industry. Yet you hear no talk of the Government taking over other industries that serve the public. The talk is only of taking over the petroleum industry or interfering with its activities.

Steel Supply Variable

"Both the steel and oil industries are confronted with problems in regard to supply that involve national policy, Minor S. Jameson, Jr., the association's economist said in analyzing the recently completed steel survey of the National Petroleum Council. On the favorable side Jameson said that the present outlook is for a production of 1,600,000 tons in 1948 of tubular goods, which is close to the estimated needs of domestic and foreign operators. The balance between demand and supply is so close that interruptions in production or stockpiling would result in shortages. Jameson also explained that unless steel supplies needed for the European recovery program can be obtained through increased production the European requirements will have to be supplied in part at the expense of the needs of the American petroleum industry.

Petroleum, despite handicaps over which it has no control, is continuing to do a good job in meeting its obligations to society and does not deserve the criticism it is getting, principally from units of government, John W. Boatright, general manager of the distribution economics department, Standard Oil Co. (Ind.), contended in a talk entitled, "Petroleum, the Industry—Black Gold, not Blackguard."

Boatright discussed several of the complaints that have been directed toward the oil industry in recent months, usually accompanied with suggestions for remedies involving the extension of government controls in oil operations. "The oil industry cannot be segregated from the rest of the economy," Boatright said in discussing the proposed National Petroleum Commission. "It is the blood stream of the economy in fact, and to introduce disease into the blood stream affects adversely the entire body." He also condemned former Secretary of Interior Ickes' supplementary plan of permitting the Government to undertake exploratory and development work. This proposal, if adopted, Boatright said, would be a "stop sign to private-risk capital entering the field" of exploration.

Taking cognizance of criticism from several sources that the domestic industry was not expanding production as it should to take care of increased demands, Boatright presented data and charts based on government reports showing that growth in crude production since the close of the war was substantially greater than the expansion in minerals and in nondurable and durable manufacturing operations.

The speaker brought up to date the Department of Labor reports showing that the latest wholesale index for petroleum products of 121 was much lower than the indexes covering building materials, chemicals and allied products, manufactured products, raw materials, foods, and farm products which ranged from just under 140 to 200.

Secondary Recovery

Pointing to the fact that the recoverable oil in many fields has been increased more than 100 per cent by the application of secondary methods, Richard V. Hughes, director of production research of the Pennsylvania Grade Crude Oil Association, summarized the present status of secondary practices. He pointed out that 110 major fields in this country produced more than 50 per cent of the 1947 crude-oil output and stated that "no major field need be abandoned within the foreseeable future once secondary recovery and related research are wholeheartedly acknowledged by the industry."

Speaking on the needs in practical secondary research Hughes explained that despite the accomplishments of the past up to one-third of the oil, as in the case of Bradford field, is left in the producing horizons as not being economically recoverable with known recovery methods.

He discussed briefly the following practices as requiring additional research at this time: (1) Obtaining reliable cores. (2) Improving core analyses and interpretations. (3) Interpretations of electric logs. (4) Response to water flooding or gas drive. (5) Predicting proper well spacing and pattern. (6) Improving well completions. (7) Prediction of proper input pressures. (8) Improvement of input waters. (9) Substitute for natural gas. (10) Detection and corrosion of bypassing and channeling. (11) Recovering oil left behind by present secondary recovery methods. (12) Economics of secondary recovery.

R. C. Earlougher, Tulsa, led the panel discussion following Hughes' address. Members of the panel and others present emphasized the need for research covering special problems in secondary recovery. The importance of adequate price for crude oil to carry on research and justify large capital expenditures for installations was also stressed.

The petroleum industry's public relations program after 3 years and an expenditure of slightly more than $1,000,000 has many accomplishments to point to, Ralph C. Champlin of Ethyl Corp. and chairman of the A.P.I. oil industry information committee explained at the forum devoted to public relations. "I think you will begin to see a significant change in the attitude of 100,000,000 people in America to whom we are trying to present the true story of a vigorous, competitive, progressive oil industry," Champlin concluded.

Frank B. Taylor, director of public relations, outlined the work the association has carried on over the past year. The activity included regular releases to publications, public libraries, universities, radio and other trade associations. Officers of the association and other members have appeared on programs of service and consumer organizations.

Oil Writers

Congressman H. A. Meyer, Independence, Kans., formerly associated for many years with the Prairie Oil & Gas Co., and later the Sinclair Prairie operations, gave oil writers his observations of the current trends at Washington having a direct bearing on oil operations of the future. He outlined the spread of bureaucracy. "It is not alone the wasteful spending and high taxes," Meyer said. "The cost is a handicap to the industrial and business welfare of the country, but there is another blighting result. Those who spend the money are going to invent things to do and each invention is another advance of the bureaucracy that stifles the liberties of the people. For proof, you writers need look no further than the screwy schemes that have been proposed to be fastened on oil activities.

Paul Hedrick, oil editor of the Tulsa World, president of the recently organized oil writers association, presided at the dinner.

The Cardwell Manufacturing Co. was host at its local plant Tuesday evening at buffet dinner to association directors and guests.

Resolutions

In resolutions the directors went on record:

Against subsidization in any form of the synthetic-liquid-fuels industry.

Against the federal Government's ownership or control of commercial liquid-fuels plants.

Favoring legislation to prevent the continuation of propaganda activities on the part of employes and officials of the federal Government.

Favoring legislation to divest the federal Government of ownership of mineral rights under lands which it has disposed of and prohibiting the retention of mineral rights in future sales.

The directors also declared that the supply of oil-country tubular goods must be increased according to the upward trend in products demand and said it is incumbent upon the steel industry to recognize demand trends and plan to meet the resulting steel requirements. They called for "constant and vigilent" scrutiny of steel exports to make certain that the welfare of the domestic industry is not disregarded.

1948 Investments of Jersey Affiliates To Exceed Half Billion, Abrams Says

STANDARD OIL CO. (N.J.) will spend more than $500,000,000 during 1948 for new equipment, plants, and facilities, Frank W. Abrams, chairman of the board, says in the company's annual financial statement, released April 27.

During 1947 the company, whose affiliates produce 14 per cent of the world's crude oil, spent $426,000,000. Additional investments during this year will make the 2-year total "in excess of $1 billion," the report says.

Gross production in 1947 by Jersey affiliates averaged 1,175,000 bbl. daily, an increase of 8 per cent over 1946 and a new high for the fourth consecutive year. Domestic production averaged 465,000 bbl. daily and foreign production 710,000 bbl. daily. "The production increased as the year advanced, and December was the peak month," the report states.

Largest increase was shown by Creole Petroleum Corp., subsidiary in Venezuela, "which accounted for about half of Jersey's gross crude output."

"Affiliates' domestic production amounted to 9 per cent of total output in the United States, and their world-wide production was 14 per cent of the world total."

In other phases of operations, the report shows that:

Exploration expenditures by affiliates in the Western Hemisphere were 16 per cent higher in 1947 than in 1946 and were about five times as great as the annual prewar expenditure.

Refining runs were 1,306,000 bbl. daily, an increase of 9 per cent over 1946.

Affiliated pipe-line companies, operating at or near peak capacities, recorded a movement of about 83 billion barrel-miles, compared with 72 billion in 1946.

Sales of refined products by consolidated companies in 1947 reached a total of 480,000,000 bbl., a 15 per cent increase over 1946 and an all-time record.

Research and development expenditures totaled $18,200,000 in 1947, an increase of 18 per cent over the previous year.

Favorable Decision Seen On Tapline Pipe Exports

NEW YORK.—A favorable decision by the U. S. Commerce Department regarding further shipments of steel pipe for construction of the trans-Arabian pipe line appears almost certain.

Max Ball, director of the Interior Department's Oil and Gas Division, was asked at a press conference in New York last week what Commerce Secretary Harriman's decision would be. Ball explained that he knew the decision but couldn't divulge it. However, he stated that it was a decision with which he was in accord.

Previously, Ball testified that he favored the export of steel pipe to the Middle East for construction of this line. Harriman's formal announcement is expected to be made after he returns from the Bogota conference.

Gulf Drilling Permits Sought by Pure Oil Co.

HOUSTON.—Pure Oil Co. has applied for a Department of the Army permit authorizing drilling operations 33 miles southeast from Grand Chenier off Vermilion Parish, Louisiana, and about 34 miles southwest of Morgan City off St. Mary's Parish. Pure is reported preparing to start drilling at the two Gulf of Mexico locations.

Another Department of the Army permit has been asked by Atlantic Refining Co., Dallas. The blanket permit sought by Atlantic is for drilling and development work on 26 state tracts covering 7,840 acres in Corpus Christi Bay central to a point about 10 miles south of Aransas Pass, San Patricio County, Texas.

Gulf Oil Corp. has filed application for permission to dredge a channel in Tabbs Bay west of the Tabbs Bay Causeway about 1½ miles south of Baytown, Harris County, Texas.

Displays Take Shape as Opening Date for Oil Exposition Nears

EQUIPMENT ranging in size from minute bearings to towering derricks was being moved into place on the International Petroleum Exposition grounds in Tulsa this week in preparation for the opening of the silver anniversary exposition May 15.

More than a third of the heavy equipment for major exhibits, much of it requiring special foundations, already was installed, and switch engines and heavy-duty trucks daily were moving more units into the exposition grounds. New major buildings were nearing completion on the north and east extensions to the grounds, not required in previous years.

Early this week seven derricks, including two portable units, had been erected and an eighth was scheduled to go up. Huge draw works for the larger rigs were moved into position and the crown and traveling blocks installed last week.

On the floors of the 380 by 120-ft. Oklahoma building, largest of the four mass-exhibit buildings, and the connected 200 by 120-ft. Kansas building, smaller items of equipment and exhibit paraphernalia were being uncrated this week as manufacturers, suppliers, and service companies began dressing up their display areas. Similar activity was under way in the Texas and California buildings on the north side of the grounds.

Space was at a premium as I.P.E. officials disclosed display areas already had been allotted to 556 contract exhibitors and 1,300 associate exhibitors. Total number of exhibitors was expected to reach 2,000 by the opening date of the world's largest oil show.

This year's exposition will continue the upward trend in both the total number of exhibitors and the space requirements of each. It will present a strong contrast with the first such exposition, held in 1923, when there were only 27 exhibitors and a total paid attendance of 14,203.

Comparison of the space requirements of the largest 10 displays in 1940, year of the last oil show, and 1948 are shown in the accompanying table.

Housing for 12,000 visitors had been allocated by the I.P.E. housing bureau last week, and the bureau was working on an additional 6,000 applications. A flood of requests for accommodations was expected during the last 2 weeks preceding the exposition opening.

Quarters also had been arranged for 180 representatives from foreign governments and oil companies operating abroad, and preparations were being made to take care of an additional 300 to 400.

Plans for brief opening-day ceremonies also were being completed this week. The program, scheduled for 30 minutes, is to be broadcast over a major nationwide network and will be highlighted by the raising of the exposition's huge 60 by 40-ft. flag.

On the speakers' platform will be Oklahoma Gov. Roy J. Turner, Interior Secretary J. A. Krug, American Petroleum Institute President William R. Boyd, Jr., Exposition President W. G. Skelly, T. P. Gilmer, Public Service Co., master of ceremonies for the oil show since 1929, and leading representatives of the Latin American oil industry.

TOP SPACE ALLOCATIONS FOR I.P.E. (SQ. FT)

	1940		1948
1. Oil Well Supply Co.	11,120	Dresser Industries	17,703
2. National Supply Co.	9,600	Continental Supply Co.	12,400
3. Continental Supply Co.	8,500	General Motors Corp.	11,970
4. International Harvester Co.	6,300	Bethlehem Supply Co.	11,790
5. Frick-Reid Supply Co.	5,600	Oil Well Supply Co.	11,120
6. Bethlehem Supply Co.	4,800	National Supply Co.	9,600
7. Caterpillar Tractor Co.	4,800	Mid-Continent Supply Co.	7,500
8. Fred E. Cooper (Allis-Chalmers)	4,800	George E. Failing Supply Co.	7,450
9. Wilson Manufacturing Co.	4,500	Hughes Tool Co.	6,400
10. Franks Manufacturing Co.	4,200	International Harvester Co.	6,300

How the International Petroleum Exposition grounds looked from the air April 23. Picture is looking east. Seven rigs may be seen, all but the one in the lower left completed. In the immediate foreground is the Hall of Science building. Long structure on the right houses the Oklahoma and Kansas buildings, and at the left the Texas and California buildings. New areas being built up for the 1948 exposition are those running along the north and east sides of the exposition grounds, to the left and rear in the picture. Color will be added to the grounds in the near future as painters complete their work, identification is added to the rigs and other displays, and decorators put on the finishing touches. By the opening date of the exposition, May 15, the few vacant areas remaining when this picture was taken will be filled with exhibits of equipment manufacturers and suppliers and service companies

this week

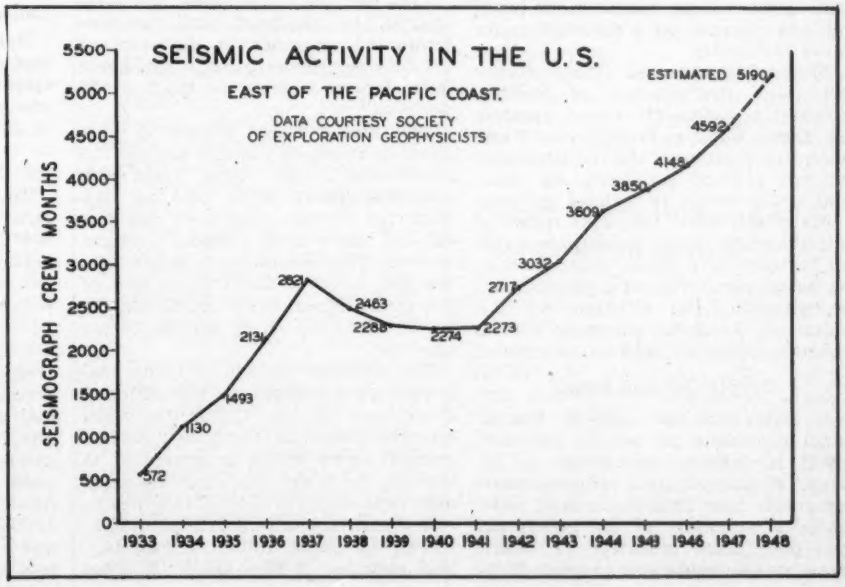
SUPPLY-DEMAND—Nation to have 6 1/2 per cent more products in 1948 with similar increase in 1949, A. J. McIntosh tells National Petroleum Association. . . . Panel shows all major consuming groups except military asking for large increases in product supply. . . . Col. G. H. Vogel says military demand expected to drop, could jump upward 25 per cent. . . . ¶Economics committee of Independent Petroleum Association of America calls for 150,000-bbl.-daily expansion in domestic production. . . . Estimates third-quarter crude demand at 5,580,000 bbl. daily. . . . Predicts 18.5 per cent increase in demand for light fuel oil. . . .

REFINING—Standard Oil Co. (Ohio) begins construction of its $11,000,000 catalytic cracking unit at Lima, Ohio. . . . ¶First fluid catalytic cracking unit in Canada is expected to be in full operation by July. . . . Other units to be in operation earlier. . . . ¶Rosewood Oil & Refining Co. completing 2,000 to 3,000-bbl. topping plant near Bishop, Tex. . . .

INTERNATIONAL—Mexico needs only equipment to develop her oil resources, Sen. Antonio J. Bermudez, general manager of Pemex, tells group at Denver meeting. . . . ¶The Kirkuk field-Haifa, Palestine, 620-mile, 16-in. crude-oil pipe line is expected to be in operation by early autumn. . . . Laying of the line is completed and pumping stations now being installed. . . . ¶Iraq Petroleum Co., Ltd., expects to begin another 16-in. line from Kirkuk to Tripoli, Lebanon, by June. . . . ¶Consolidated Refineries, Ltd., officials expect the Haifa refinery to be shut down indefinitely. . . . The plant closed April 12 after Arabian workers were injured by Jewish terrorists. . . . ¶U. S. Department of Commerce decision favoring export of steel pipe to Middle East, expected. . . . ¶Completion of Chile's thirteenth Spring Hill test is expected this week. . . . ¶Russia's oil position is unfavorable for waging war, House Select Committee on Foreign Aid says in a study of Russia's productive position. . . .

TIDELANDS—House scheduled to take up tidelands bill this week. . . . Favorable report by judiciary committee says private interests under state control "have been eminently more successful" in developing resources. . . . Report criticizes federal control as a "step in the direction of nationalization of the natural resources" of the nation. . . . Louisiana leases 152,138 acres of offshore lands, some leases extending to 27-mile limit. . . . Bonuses total $1,792,437. . . . Stanolind Oil & Gas Co. asks permit for Gulf drilling platform off Galveston County, Texas. . . .

TRENDS—Crude-oil production sets an all-time record, averaging 5,430,985 bbl. daily during week ended April 24. . . . Output is an increase of 4,360 bbl. daily over previous record high of 5,426,625 bbl. daily, set during week ended February 28. . . . ¶Stocks of four major products, while down 5,494,000 bbl. since the first of the year, still stand at 20,239,000 bbl., or 11 per cent, above stocks on April 17 last year. . . . Drop during same period a year ago was 36,500,000 bbl. . . . ¶Deliveries of four major products in the past 4 weeks show 10.5 per cent gain over same period a year ago. . . . ¶Well completions since January 1 total 10,682, against 9,381 for same period last year. . . . Wildcat completions for week ended April 24 total 121, an increase of 14 per cent over the previous week and 57 per cent over comparative period in 1947. . . .



The upward trend in exploratory work and the use of geophysics is illustrated in this chart. The initial gain from 1933 to 1937 was due to the acceptance of seismic methods. Between 1937 and 1941, the demand for new reserves was not pressing. The war and postwar demand for new reserves is reflected in the recent increase in seismic field work

Problem of Meeting Huge Demand Takes Spotlight Before N.P.A.

by Arch L. Foster

CLEVELAND.—There is a shortage of crude oil, and it is time that this fact be understood by the entire country, B. L. Majewski, vice president of Deep Rock Oil Corp. told members of the National Petroleum Association at their forty-fifth semi-annual meeting here.

Speaking in the general session April 22, Majewski declared the oil shortage is due mainly to the lack of steel.

Additional oil, when obtained, will come largely from foreign sources, he said, declaring it is high time that Congress and the country consider removing all import duties on crude in order that this country might obtain more easily and cheaply the 600,000 bbl. of additional crude per day required to meet immediate future demands.

"We are doing things which will force the oil industry under government regulation, simply by doing things which prevent our obtaining enough crude to meet requirements," he said, summing up a plea to the industry to put its house in order.

Half of this additional 600,000 bbl. daily, he said, will be needed in District 2 to enable refiners and marketers there to meet the too-rapidly increasing demand for motor fuel, fuel oil, and diesel fuel, especially.

The oil industry, he asserted, should be urged to conduct a "bang-up" conservation campaign to save oil and operate oil-consuming units more efficiently.

Majewski expressed strong disapproval of the practice of making optimistic statements not supported by facts. Failure to tell the truth about the position of the industry will worsen present problems, he said, and could result in federal control.

Majewski said the bill recently introduced in Congress to control the oil industry as a public utility, while buried in committee at present, must be eliminated for all time by the industry's doing its job so well that no such control might be necesary.

Supply-Demand Panel

A feature of the meeting was a panel discussion on supply and demand in which representatives of the six major groups of oil consumers presented their 1948-49 demand estimates. A summary of the ability of the petroleum industry to meet those requirements was presented by A. J. McIntosh, Socony-Vacuum Oil Co., Inc., economist.

McIntosh said that while there is "no superabundance of petroleum in sight" during the next 2 years, it appears that there will be about 6½ per cent more products available to United States consumers in 1948 than in 1947, with the same rate of increase to hold for 1949.

He said between 8 and 9 per cent more light products will be available, but that requirements for gasoline and middle distillates are estimated at 12 per cent more. Source of the additional product is unknown at present, he added.

An increase of 9½ per cent in home heating oil demand was forecast by McIntosh, without considering oil burners installed in 1948. This additional oil, he said, would be required to supply for a full season the 829,000 new oil burners installed in 1947, which required only a half-year's supply. The number of burners being installed this year is far below that of the boom year 1947.

Military Needs Drop

Discussing military requirements, Col. G. H. Vogel, of the Armed Services Petroleum Board, said basic requirements for the fiscal year 1948 will total 125,000,000 bbl. For the 1949 fiscal year basic demand will be about 5,000,000 bbl. less, he said.

"Let me warn that these are base figures," he continued, "and that contemplated increases in the military establishment may quickly run these basic figures upward as much as 25 per cent."

The armed forces expect to purchase as much as possible outside the continental United States, Vogel said, including about 60,000 bbl. per day from the Persian Gulf area and 40,000 bbl. daily from Aruba-Caribbean sources. This would leave about 230,000 bbl. daily, or about 4 per cent of the total United States crude output, to be obtained from United States sources.

The industry, he said, is being presented each month by the Military Petroleum Supply Committee estimates of petroleum needs by quarters and by areas where procurement is desired, in order that the industry may keep informed of military needs.

Representing the oil-heating industry on the panel, Robert Gray, business manager of Fuel Oil & Oil Heat magazine, said the 3,875,000 oil burners in use in 1948 will require 188,000,000 bbl. of distillate fuel oil, compared with 163,000,000 in 1947, or an increase this year of 15 per cent. In 1949, he predicted, there will be 4,000,000 burners requiring 207,000,000 bbl. of oil, or a further increase of 10 per cent.

Recent surveys, Gray said, show that 44 per cent of American home owners wish to heat with oil; 33 per cent prefer gas; 18 per cent want coal, and 5 per cent prefer electricity for home heating. Half of the 7,500,000 oil-heating units desired in this country had been installed at the beginning of 1948. Unfavorable publicity about the oil shortage has reduced the rate of new installations to a very low figure. While 16,000 new units were installed in January, only 8,000 were placed in March, he said.

The best available estimates of burner needs for 1948 and 1949 show that while the average burner in 1947 required 50.3 bbl., needs will be about 49 bbl. per burner in 1948 and 47 bbl. in 1949.

More Cars to Fuel

Russell E. Singer, executive vice president of the American Automobile Association, told oil-industry men that an estimated 21,000,000 cars in operation this year will increase to 34,000,000 in 1949, boosting the consumption of motor fuel from 21 billion gallons in 1948 to 23 billion gallons in 1949.

Four million new automobiles are "hoped for" in 1948, Singer said, while the low rate of scrapping old cars is expected to continue until automobile production equals demand.

Diesel Demand Up

How the demand for diesel fuel for railroad operations is increasing was described by W. W. Kelly, general purchasing agent for the A. T. & S. F. Railway System.

Railroad diesel-fuel consumption was 60,600,000 gal. in 1940, had climbed to 513,600,000 gal. in 1946, and was an estimated 719,000,000 gal. in 1947. The increase in demand will be at least 200,000,000 gal. yearly during the next few years, he said.

The number of diesel units in operation by the railroads was 967 in 1940 and had increased to 6,100 in 1947. At this rate, the number might be expected to reach 10,000 units within the next 6 years, he said.

Other Demands Greater

K. W. Anderson, of Deere & Co., predicted the 3,118,000 tractors of both wheel and track type now operating will require more than 4 billion gallons of fuel this year. C. R. Jonswold, of the Burning Oil Distributors Association, said each of the nation's 3,000,000 space heaters in use in 1947 will consume 650 gal. each year. Contemplated additions, he said, will

boost fuel-oil sales in 1949 50 per cent above those of this year.

Addressing a joint meeting of the Department of Manufacture and the Department of Standards and Tests, M. W. Holaday, Socony-Vacuum Oil Co., Inc., said that since more than $4 billion must be spent by the petroleum industry during the next few years to meet gasoline quantity demands alone, the octane number level will not rise as rapidly as it has in the past.

Significant improvements in fuel economy can be obtained by using higher octane number fuels in higher compression ratio engines, Holaday said, and he emphasized that this consideration, rather than better engine performance, should govern the introduction of engines with higher compression ratios.

Marketing policies, he said, should lead to the production of about 20 per cent of our total demand as premium gasoline to supply the proposed high-efficiency passenger cars.

D-2 Work Described

In another talk before the same group, H. P. Ferguson, chief of the refining-control division of Standard Oil Co. of Ohio, described the work of Committee D-2 of the American Society for Testing Materials.

Describing the committee as a "legal combine of competitors," Ferguson said that by "combining" with both competitors and customers a common language of test methods and their results have been worked out, enabling the industry and the consumer to standardize qualities of products to the advantage of all concerned.

Monroe Attorney Seen As McHugh Successor

BATON ROUGE.—S. L. Digby, Monroe, La., attorney, is expected to become the state's new conservation commissioner, thus heading Louisiana's oil-regulatory agency.

Earl K. Long, who will take office May 11 as Louisiana's new governor, has indicated he will appoint Digby to succeed Joseph McHugh.

The governor-elect originally planned to name Sam Caldwell, Shreveport, secretary of the Arkansas-Louisiana division of the Mid-Continent Oil and Gas Association, to the post, but Caldwell declined the appointment.

Though replacement of McHugh is considered certain, there is some speculation over whether the change in state administration and the commissioner will result in new personnel throughout the department. Much of the department's work is handled through its six branch offices over the state, and the engineers heading these offices may be protected by the state's civil-service regulations.

Long's election by the greatest majority ever given a candidate in the governor's race was one of the most surprising developments in Louisiana's turbulent political history. Thus far, he has given no indications of plans unfavorable to the oil industry of the nation's third largest producing state.

The legislature convenes concurrently with Long's inauguration, and a number of matters of importance to the industry will be considered. Chief among these is the question of taxes.

In his campaign, Long committed himself to various projects involving heavy expenditures by the state, but he has avoided giving any disclosure of how he plans to finance these programs.

There has been discussion of a possible raise in Louisiana's present ½-cent natural-gas gathering tax. The question of natural-gas taxes has long been a lively political issue in the state. In the 1946 legislature, the state's declared policy against "export" of natural gas was discarded, and attempts to increase the gathering tax several fold were defeated. One of the principal supporters of this 1946 increase in the gathering tax was Morris Lottinger, Terrebonne Parish, who is Long's choice for speaker of the new legislature.

In addition to the gathering tax, the industry in Louisiana pays a severance tax of 3/10 cent on natural gas and graduated from 6 cents upwards on oil.

Whether Louisiana's tax-exemption plan for new industries and industrial improvements will survive, the new legislature also is in doubt. Since this went into effect in December 1946, approximately $250,000,000 worth of new industrial property has been given ad valorem tax exemptions by the Department of Commerce and Industry. A large part of this is new oil-industry property.

S.E.G. Officers Named

DENVER.—L. L. Nettleton, Houston, partner in Gravity Meter Exploration Co., was elected president of the Society of Exploration Geophysicists here this week.

Andrew Gilmour, Tulsa, chief geophysical supervisor of Amerada Petroleum Corp., was elected vice president, and E. V. McCollum, Tulsa, partner in E. V. McCollum & Co., was elected secretary-treasurer.

For papers presented at the joint meeting of the S.E.G., the Society of Economic Paleontologists and Mineralogists, and the American Association of Petroleum Geologists, and other related material, see the special geological section in this issue, beginning on page 98.

Wilson Sells Interest In Wil-Tex Oil Corp.

CORPUS CHRISTI.—Sam E. Wilson, Jr., Corpus Christi independent, has sold his interest in Wil-Tex Oil Corp. to Panhandle Producing & Refining Co. for a reported $4,000,000.

Wil-Tex will continue to operate under the same name with James B. Boyce, president of Panhandle, as president. Its office to be opened May 1 in Corpus Christi will be in charge of Robert B. Thompson, vice president.

Wil-Tex has production in East White Point, Refugio, and West Ranch fields and partially developed leases in Refugio County. Monthly production is reported to be about 43,000 bbl. of oil and 140,000,000 cu. ft. of gas.

Survey Shows California Oil Wages Up $1.50 to $2

A recent survey taken by Oil Producers Agency of California of major, minor, and independent oil companies in the state shows that in each group prevailing wage rates for drilling and production employes have increased $1.50 to $2 per day over those of last year.

Most companies have abandoned the practice of paying cost-of-living bonuses, and have included the amount in basic wage rates, the survey revealed. In addition to the basic rate, all of the majors, most of the principal minors, and a few independents, pay a shift differential of 6 cents per hour for the midnight to 8 o'clock shift and 4 cents per hour for the afternoon shift from 4 p.m. to midnight.

The survey covers 33 oil-field job classifications of 8,333 workers on which 7 major, 37 principal minors, and 76 independent companies reported.

Fraser Takes Hoffman's Post as Head of A.S.F.

Alexander Fraser, president of Shell Union Oil Corp., has been elected chairman of the Automotive Safety Foundation. He succeeds Paul G.Hoffman, Studebaker Corp. president who recently was named administrator of the European Recovery Program.

This foundation, created in 1937, makes grants of funds and of technical staff assistance to a wide list of national organizations and governmental agencies for work in traffic safety, highway development, and related transportation fields.

International

WORLD-WIDE OIL DEVELOPMENTS

Mexico Needs Only Equipment to Develop Resources, Bermudez Says

DENVER.—Mexico is fully capable of developing her own oil resources, but needs American equipment, casing, and "confidence" to do it, Sen. Antonio J. Bermudez, general manager of Petroleos Mexicanos, declared here April 26.

Speaking at the joint annual meeting of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists, and the Society of Economic Paleontologists and Mineralogists, Bermudez outlined Mexico's views on the current oil situation in the Western Hemisphere.

In a three-point summary, he said:

"1. I believe, as thousands of others do, in the great oil wealth of Mexico's unexplored underground.

"2. I am firmly convinced that Petroleos Mexicanos is capable of developing new oil reserves to the extent that our economic structure demands, and to the extent also that we perform our duty by doing our share in providing oil to help achieve the proper equilibrium in supply and demand, and be prepared to meet any contingencies pertaining to continental defense.

"3. A definite cooperation from this great country (United States) for the acquisition of equipment and casing is needed to enable Petroleos Mexicanos to achieve this purpose."

To Contract Drilling

On the all-important topic of what terms United States companies might expect in deals for the drilling of wildcat wells and development of any fields found, the director threw little new light. He stated:

"We are at present contracting the drilling of wildcat wells with American contractors and have just completed negotiations with a well-known and responsible oil company of this country whereby we are being financed to develop very large and promising areas." (Note—This apparently refers to the Cities Service Co. contract, details of which will be found in The Oil and Gas Journal, April 15, page 58, and April 22, page 61).

"Similar contracts could be entered into with Petroleos Mexicanos if our terms, which are reasonable, are met. Our earnest desire to increase production leaves the door open for convenient drilling and engineering contracts, which our law and the policy of our government does not oppose."

Praising the quality of the geological and geophysical staff of Pemex, which he stated had been built up patiently over the years, with help and assistance of several well-known American geologists, geophysicists, and paleontologists, the director said his exploration men were full of enthusiasm in their work in the service of their country, and lacked only the valuable experience which would come with age.

Has Many Locations

As a result of the work of this staff, Pemex now has a substantial number of wildcat locations checked by all exploration methods applicable to the areas in which they lie. Justification for drilling them is considered, by Pemex, as beyond any technical doubt. Furthermore, at the present rate of progress, it is expected that more than 100 first-class wildcat locations will be developed each year.

Mexico has no desire to live under the deceptive mirage of great theoretical oil wealth, and recognizes that it is of no use to have a large number of first-class geological and geophysical prospects if they cannot be tested promptly by wildcatting. Bermudez emphasized that because of this, it was the policy of Pemex to make a maximum effort to keep the wildcat drilling campaign in line with the geological and geophysical structure finding rate.

Bermudez then remarked: "Unfortunately, in this aspect we have been handicapped by difficulties encountered in obtaining drilling equipment, and especially casing and tubing. These difficulties, so acute during the war period, still persist, perhaps with more seriousness in the present years; and all our efforts are now being directed toward convincing the American Government and the American manufacturers of the necessity of making available to us those tools that are fundamental for the discovery and development of new oil reserves in Mexico.

"It is to be regretted . . . that the present steel situation has in a large measure prevented us from following up the campaign to its logical conclusion, which is the discovery by the drill of new oil reserves and their immediate development."

Progress Cited

Mexico, in spite of all difficulties, has several rigs active in wildcat drilling now and the number will be increased as materials are obtainable. The Pemex staff believes that new discoveries are sure to follow. Even under handicaps, three new gas-distillate fields have been discovered, new sands in old fields have been found, one new oil field which shows signs of being a major field has been discovered, and in three areas, favorable oil shows have been found which Pemex believes will result in new oil fields when additional tests are drilled.

The Mexican oil men feel capable of developing their own resources and all of their efforts are set to this task. But they need the help of the United States to achieve their objectives; particularly ready access to equipment and casing, and most of all, reassurance in the form of confidence by the United States that Pemex has the ability and will make the effort to carry out the task it has set for itself. The director touched on the international relations aspect of the problem, saying:

"A denial of our requirements at this moment would not only be against our own industrial and economic development, but it would be directly aimed against utterly compulsory increase of production in this Western Hemisphere, necessary to satisfy increasing demands and to build up reserves essential for continental defense."

Jones-Pemex Contract Valid, Work Slowed by Shortage of Casing

ALTHOUGH a high-ranking official of Petroleos Mexicanos, Mexico's government oil monopoly, stated publicly on April 15 that the Cities Service Co. contract with Mexico was the only extant contract involving the development of its country's crude-oil resources, Antonio J. Bermudez, director of Pemex, stated on April 22 that the J. Edward Jones contract definitely had not been canceled.

Moreover, Jones' initial wildcat well, 11 Mission in the Reynosa district, across the border from McAllen, Tex., was drilled to 6,020 ft. and just abandoned as a dry hole. The rig is being moved to the Mission-Tamaulipas zone, according to Bermudez.

The Jones contract, which was signed June 28, 1947, contemplates a $20,000,000 drilling program on sites selected by Pemex. In addition to the one rig which Jones has in Mexico, he states that he has a firm contract for five additional power rigs as soon as casing is available.

The Jones contract will be financed by 250,000 peso ($50,000) bonds which, in accordance with the Jones-Pemex contract, will be issued by Pemex.

Pemex is to pay 6 per cent interest annually, payable in 10 years and guaranteed by the Mexican Government as to payments of both principal and interest.

The bonds carry the provision that the bondholders may either convert to cash or oil. The contract states that such oil is to be made available by Pemex from production, if any, from the wells (the initial 100 wells) to be drilled under this contract and to be delivered on the order of the bondholder F.O.B. at the commercial market price.

Jones stated that the Mexican bonds will be converted into dollars by a Wall Street syndicate which is interested in financing the deal.

Furthermore, the contract provides that the bondholders are entitled to 50 per cent of all production from the 100 wells up to but not exceeding 25,000 bbl. daily. Jones estimates that approximately 10,000,000 bbl. of crude will be made available to bondholders from the first 100 wells. The Jones contract calls for proving up any area where an oil or gas well is brought in. In case of a gas well, Jones is to get 35 per cent of the proceeds from the wells, payable in United States currency.

Jones states that he has run into considerable delay in expediting the drilling program due to lack of casing.

Laying of Kirkuk-Haifa 16-In. Line Is Completed; To Be Operating This Fall

BY next September or October it is expected that the 620-mile, 16-in. crude-oil pipe line from Iraq's Kirkuk field to Haifa, Palestine, will be in operation. Laying of the line has been completed and pumping stations are now being installed. This line will augment present Kirkuk deliveries to Haifa by about 94,000 bbl. daily, making total deliveries there from Iraq about 135,000 bbl. daily. The 16-in. line parallels an existing 12-in. line.

By June, Iraq Petroleum Co., Ltd., which is building the additional pipeline facilities, expects to start laying another 16-in. pipe line from Kirkuk to Tripoli, Lebanon, a distance of 530 miles. This, too, will parallel an existing 12-line. January 1950 is the tentative date set for completion of this segment. When both segments are completed, the daily crude-oil deliveries from Kirkuk to the Mediterranean will approximate 275,000 bbl., against current daily deliveries of around 90,000 bbl.

About 60,000 tons of this pipe is being supplied by Britain's Stewarts and Lloyds and the remaining 100,000 tons by two French firms, Ste. Escaut et Meuse, at the Anzin plant, and Ste. Louvroil, Montbard et Aulnoyne, at the Aulnoye plant.

Meanwhile, a report from a well-informed source indicates that Iraq Petroleum Co. is going ahead with its plans to build a 30-in. crude-oil line from Kirkuk to some undisclosed Mediterranean port as soon as the necessary pipe can be obtained, probaly after 1952. Pipe for a line of this diameter would have to be obtained in the United States, and, according to orders which have been placed with pipe-rolling mills here, the capacity to handle Iraq's "big-inch" needs won't be available for several years.

International

Completion of Thirteenth Spring Hill Test Expected

Completion of Chile's thirteenth test well in Spring Hill field, Tierra del Fuego, is expected this week. Projected depth is approximately 7,500 ft.

Of the 12 wells drilled to date, 6 are oil producers, 4 gas producers, and 2 were dry holes. Lack of storage and pipe-line facilities has prevented accurate flow tests, but it is believed that the oil wells have a daily potential of about 500 bbl. each. The crude is 39.5° A.P.I. gravity.

Chile's Corporacion de Fomento de la Produccion is also currently drilling two wildcats. One is in the Espora area, about 5 miles north of Spring Hill and the other in San Sebastian, 50 miles south of Spring Hill. The Espora test probably will be completed late in April and the San Sebastian wildcat late in May. At San Sebastian plans call for drilling deeper than 7,500 ft. — the average depth of wells drilled in Chile to date —if necessary.

By the middle of 1949, Fomento hopes to have a 50-mile 6-in. crude-oil pipe line constructed. The line will run from Spring Hill to the port of Bahia Gente Grande.

Colombian Oil Operations Reported Back to Normal

NEW YORK.—With the return to work of employes of Tropical Oil Co. and the Royal Dutch-Shell group in Colombia, oil operations there are said to be back to normal.

Commenting on Colombia's bloody disorders, an oil official in New York stated that while Communists participated in the attempted overthrow of the Colombian government, the chain of events was too well organized to believe that they were in it by themselves. One of the aims, he said, was to halt all oil production, an attempt which failed.

Tropical's operations ceased from April 9 to April 20. No casualties have been reported and equipment which was removed is said to have been recovered.

Colon Production Up

Venezuelan crude-oil production of Colon Development Co., Ltd. (Shell), for the 4-week period ending March 29, totaled 317,822 bbl., or approximately 11,350 bbl. daily. This compares with 315,479 bbl., or about 11,267 bbl. daily, for the 4-week period ending March 1.

Oil Companies Losing Interest in Peru As Oil Law Stays Mired in Politics

BECAUSE of the lack of an adequate Peruvian oil law, United States, British, and Canadian oil companies are rapidly losing interest in expansion programs in that country, according to information just made available by Dr. J. C. Sproule, in a paper prepared for the annual summary of world-wide petroleum activities by the American Institute of Mining and Metallurgical Engineers. Sproule is in the exploration department of International Petroleum Co., Ltd.

The proposed "adequate" oil law referred to by Sproule was drawn up by A. A. Curtice and has been pending in the Peruvian congress for about 2 years. It would open up the vast Montana region, east of the Andes, to exploratory and development activities and would modify existing oil regulations elsewhere in Peru.

While it is considered certain the government-favored law would be passed in a congressional vote, the minority conservative party has refused to attend sessions of the congress, preventing consideration by a quorum. Negotiations currently are

International

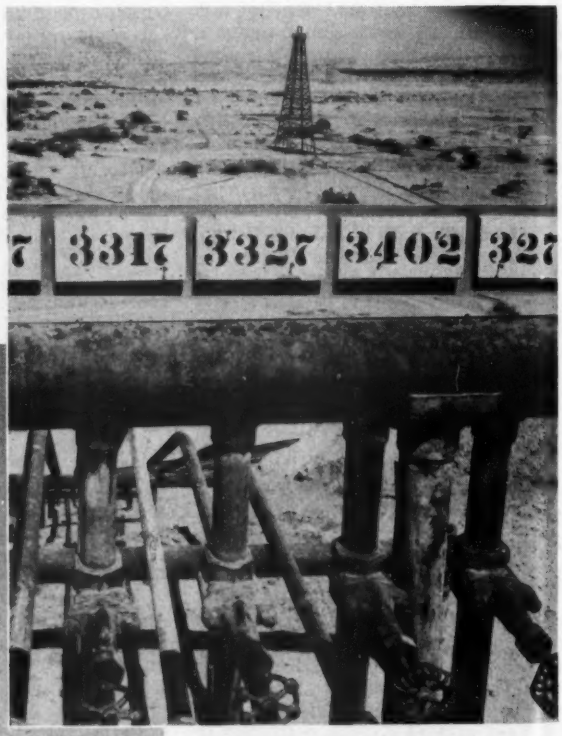
under way between the government and the minority party with a view to consideration of the law in a June session of the congress.

Passage Hopes Wane

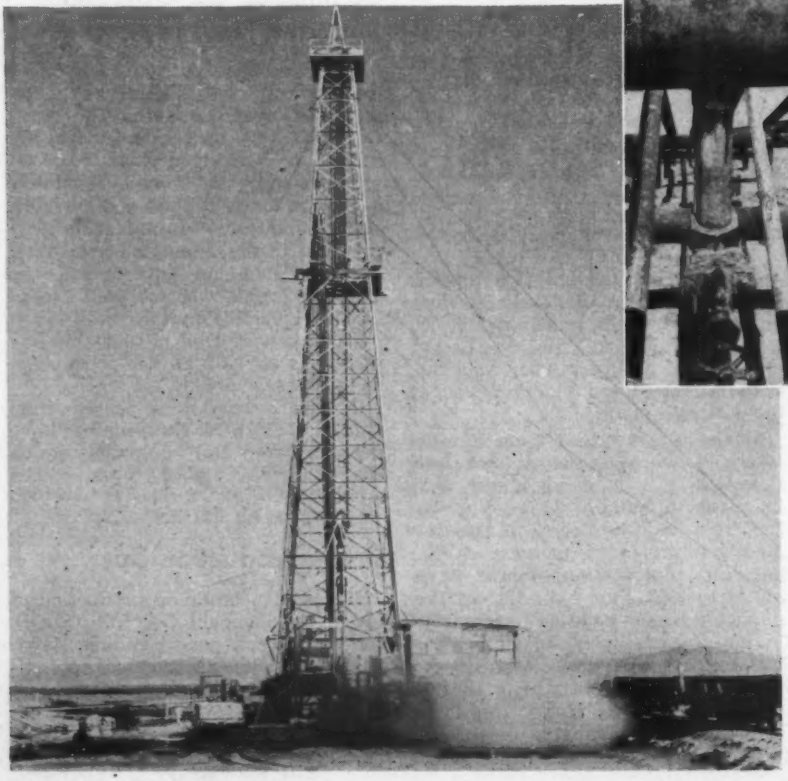
Early last year when passage of the law was anticipated, continued interest in eastern Peru was shown by several major United States oil companies. With a continued congressional stalemate, however, interest waned.

Royal Dutch-Shell interests wound up a 2-year program of geological exploration, supplemented by aerial photography, and then left Peru in 1947. After 4 years of similar exploration work, Socony-Vacuum Oil Co., Inc., made plans for a greatly reduced program this year. International sharply curtailed a 3-year exploration program at the year's end.

Of the other companies operating in the Montana region, Ganso Azul, the only oil producing company there, carried out no drilling or exploratory work in 1947. Cia. Peruana de Petroleo (Oriente Co.) completed its first wildcat well in the Contamana area as a dry hole and made plans to drill a second wildcat, on the Pisqui anticline. The Peruvian Government-operated Santa Clara well, on a national



Each number in the accompanying picture, right, represents a producing well that feeds its oil to a battery station where oil and gas are separated and pumped to gas plants



The well pictured at left is drilling in a proven section of Talara field which has a myriad of stratigraphic traps of possibly a few hundred feet across

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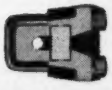

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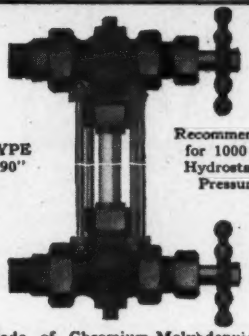

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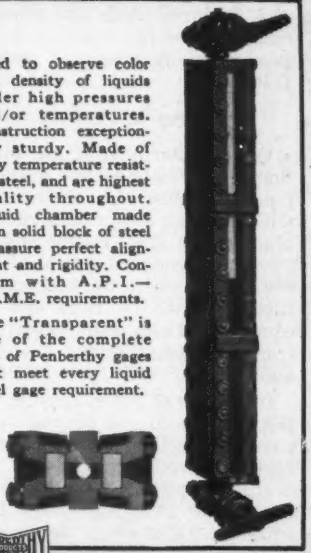

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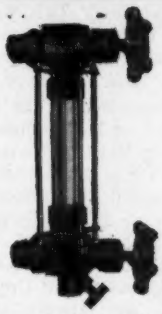
"ALL IRON"

LIQUID LEVEL GAGES



Body made from a special high strength alloy iron, shanks alloy steel and trim stainless steel. Extra heavy construction throughout, automatic and positive shut-off if glass breaks, heavy duty stuffing boxes. Conform with A.P.I.—A.S.M.E. requirements.

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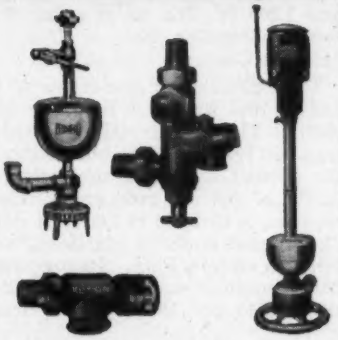

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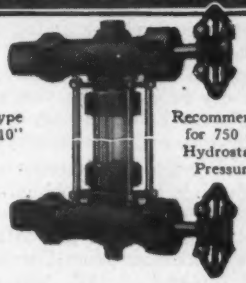
DROP FORGED STEEL

LIQUID LEVEL GAGES



Type "10"

Recommended for 750 lb. Hydrostatic Pressure

Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous; stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

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reserve in the Contamana area, was still drilling its first well at the year's end. In Pirin field, also government-owned, there has been no drilling or producing operation of note since 1940.

Drop in Production

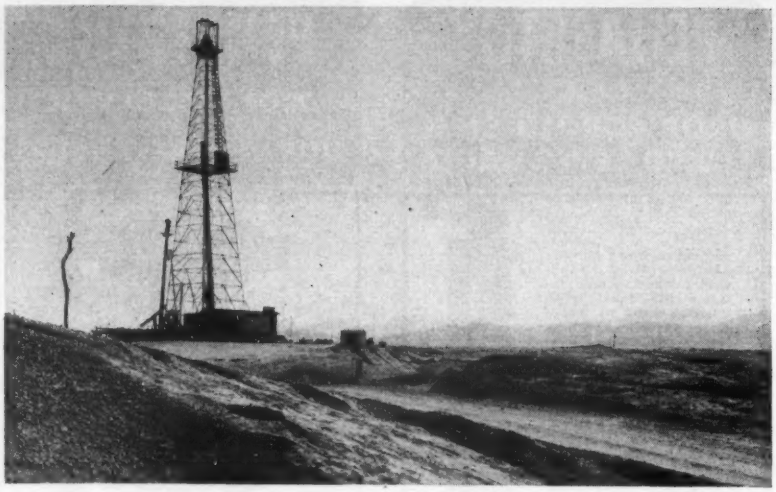
Over-all Peruvian crude-oil production continued to decline in 1947, dropping to 34,966 bbl. daily, compared with the high of approximately 48,000 bbl. daily in 1936. By the end of 1947, Peru had produced a total of 358,176,390 bbl., of which the bulk came from International's La Brea and Parinas concession field, with lesser amounts from Zorritos, Lobitos, Ganso Azul, and Pirin.

Indicative of the increasing difficulties of maintaining production in International's La Brea and Parinas concession, Sproule pointed out that the average depth of all holes drilled to the end of 1946 was about 1,700 ft., whereas the average depth of completed holes drilled in 1947 was 3,649 ft. Total footage drilled in 1947 was 345,237 ft., bringing the total cumulative from the beginning of operations to 6,502,031 ft.

During 1947, 102 wells were completed on the La Brea and Parinas concession, 73 of which were development wells and 29 exploration wells. Of the exploration wells, 7 were oil producers; 3 were gas producers; and 19 were dry holes. Three of the 7 productive exploratory wells discovered new pools, 2 in the Parinas and 1 in the Pale Greda sands. The remaining four wells extended old pools. Of the development wells, 59 were oil producers; 1 a gas producer; and 13 were dry holes. At the year's end, 16 wells were being drilled, 8 of them exploratory and 8 development wells.

The average daily production from the Zorritos holdings, which are held by the Peruvian Government, was about 320 bbl. daily. The total cumulative production from Zorritos field, as of the end of 1947, was approximately 3,880,480 bbl. As of the end of last year, 474 wells had been drilled at Zorritos, 57 of which were still producing. Four new producers were brought in last year.

On the Lobitos-El Alto property, operated by Lobitos Oil Fields of London, an affiliate of Anglo-Ecuadorian Oil Co., Ltd., the average depth of all holes drilled to the end of 1947 was 2,451 ft. From the beginning of operations to the end of 1947, a total of 1,234 wells have been drilled, all of them with cable tools. At the end of 1947, there were 890 wells still producing. Total cumulative crude-oil production to the end of 1947 was 64,880,413 bbl., and the average daily production through 1947 was 6,361 bbl. This production accounts for about 18 per cent of Peru's total output.



Pictured here is a wildcat well on the far southern border of the field. Only by drilling can the limits of the oil bearing area be determined. The numerous tiny stratigraphic traps make surface and subsurface geology almost useless

The structural and stratigraphic picture of Lobitos is quite similar to that of the La Brea and Parinas concession, with the Eocene productive sand being broken by block faulting into a complicated system of pools.

On the Ganso Azul (Agua Caliente) concession, a total of nine holes have been completed, six of which have proven to be productive. At the end of last year all six of these wells were producing. Present production comes from a 300-ft. Cretaceous (or Jurassic) sand at the base of the Mesozoic group. The wells drilled produce from depths varying between 1,000 ft. and 1,200 ft. The oil is either from contemporaneous beds or from underlying Carboniferous strata.

Total cumulative production to the end of 1947 from this field was 388,566 bbl. The average daily production through 1947 was 323 bbl., although the present combined productive capacity of the six producing wells is reported to be 2,500 to 3,000 bbl. daily. The market outlet is practically confined to eastern Peru, although some crude products were shipped to Brazil in 1946 and 1947 by river transport.

Pirin Field Inactive

Pirin field is a Peruvian Government-operated project situated in the high Andes northwest of Lake Titicaca at an elevation of over 12,000 ft. First production from this field was reported in 1906. Between that time and 1940, when the production was cut off by water invasion, the 13 wells there produced a total of 286,644 bbl. of oil. The oil apparently came from highly-faulted Cretaceous limestone. No drilling or production activity was reported from Pirin field in 1947. Total cumulative footage drilled in this field is 17,407 ft., all with cable tools.

In the vicinity of Contamana on the Upper Ucayali River, drilling operations were conducted through most of 1947 by the Peruvian Government in its 1 Santa Clara well, and by a private Peruvian company, Cia. Peruana de Petroleo (Oriente Co.) in the 1 Rayo well.

The Santa Clara well is situated in an area of national reserve, 3 miles west of the Ucayali River, about 125 miles north of Ganso Azul. After nearly 12 months of drilling, the well had by the end of last year reached a total depth of 850 ft. in the Lower Cretaceous sandstone and was approaching the productive horizon of Ganso Azul field. This well is drilling on a closed domal structure somewhat similar to, but smaller than, the Ganso Azul structure.

The 1 Rayo well of the Oriente Co. was drilled and abandoned in 1947. This well is located 5.4 miles east of the Santa Clara well on the east side of the Ucayali River. Structurally it is located near the northern tip of the large and well-defined Contamana anticline. This well passed through Lower Cretaceous and Upper Jurassic strata and into igneous basement at 2,000 ft. without encountering shows of either oil or gas. At the year's end, Oriente Co. was preparing to move its drilling equipment up Pisqui River to the large and well-defined Pisqui anticline. The company expects to spud in 1 Pisqui about the middle of this year. The anticipated drilling depth to the Lower Cretaceous sand objective is 7,500 ft.

(Summaries of other A.I.M.E. production papers were published by The Oil and Gas Journal, February 19, page 73; February 26, page 93; and March 4, page 47.)

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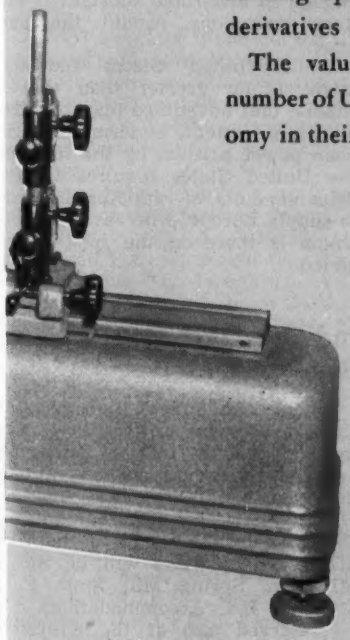

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House Group Sends Tidelands Bill To Floor, Recommends Passage

WASHINGTON.—The House judiciary committee last week sent the tidelands bill to the floor, where it was to be taken up April 29, while at the same time the Senate judiciary committee announced it would reopen its hearings on the measure some time next month.

In its report, the House committee charged that the only reason advanced by federal officials opposing the bill "is their desire for federal management of the production of oil," and pointed out that the controversy had its inception in 1937 in the Government's attempt to secure congressional sanction of its plans to assume control of the California submerged oil fields.

Further, said the committee, the problem is not limited to oil, as represented by officials, but could readily include any and all other underwater resources.

The report asserted that the theory of establishing government oil reserves by setting aside undeveloped areas has been discarded by practically all competent persons who have studied the matter, and the Defense Department now is in process of returning to the Interior Department all but two of its naval reserves.

If the lands are transferred to federal control, the Government will have to begin from scratch, first securing a law for their operation, then creating additional bureaus, promulgating rules and regulations, and issuing leases, resulting in delaying for an indefinite time the intensive development now under way, the committee held.

"The evidence does not show any reason why, from a policy standpoint, state control should not be continued," it declared. "There is nothing in the record to justify a conclusion that state control is wasteful or improvident, or that under federal control one more additional barrel of oil will be discovered or produced from these lands."

Further, the report continued, "the evidence is conclusive that private interests operating under state control have been eminently more successful in developing our oil resources than under federal controls.

"Two other policy considerations lead the committee to believe that continued state control of these lands is desirable," the report continued. "One is that state control is more conducive to operations on submerged lands by the smaller independent producers. . . . The second consideration is that federal control of these vast deposits would be another step in the direction of nationalization of the natural resources of the nation, to which the committee is opposed."

Russia Not Ready Oil-Wise for War, Needs Several Years, House Group Says

WASHINGTON. — Russia today is not prepared oil-wise for war on a large scale, and will not be for several years to come unless it can count on quickly and easily taking over important oil areas of the Middle East, it is indicated in a study of the Soviets' productive position issued last week by the House Select Committee on Foreign Aid.

Inability to get back even to the prewar level of steel production—which may not be achieved before 1950—is another bottleneck in Soviet economic development, and while coal production reached prewar volume last year the average caloric content is lower than it was in 1940, the study disclosed.

Discussing oil, the report prepared by the committee staff pointed out that while production is still far below the prewar level, output has been increasing very rapidly and in 1947 probably reached the neighborhood of 26 million metric tons. The 1940 production was 31 million tons, and the target of the current 5-year plan is 35 million tons in 1950, but the 1947 total represented a gain of some 6,600,000 tons over 1945.

"At the present time," the report stated, "the oil industry is one of the few branches of industry which has been increasing at a faster rate than called for in the plan. The 1946 output increased 12 per cent, and in the first 9 months of 1947 it increased 18 per cent. It is quite possible that by 1950 oil output will be greater than originally scheduled in the 5-year plan. In view of the falling off of the Romanian fields, increased production of the Soviet fields is all the more significant.

"But the requirements for oil have also tremendously increased," the report continued. "While the Baku fields have increased production, the outlook on a long-term basis is for declining production. The net picture is one that would not encourage the Kremlin to undertake a war on a global scale, unless it could count on overrunning productive fields from which it would be possible for them to transport oil back to Russia or to the fighting front."

Back to Prewar

Although deficient in some areas, the report emphasized that total industrial production in the Soviet Union is now as large as it was before the war, and its capacity to produce military equipment is now greater than prewar.

"Consequently," it was cautioned, "it would appear incorrect to argue that the Soviet Union which, in the final analysis, produced the bulk of the supplies used in its fight against the Germans, is not now strong enough to undertake substantial military operations, should the need arise."

While United States industrial might is far greater than that of Russia, that advantage may be offset to a large extent, in terms of European power politics, by the fact that the United States requires tremendous amounts of shipping in order to supply Europe, whereas the Soviet Union is there on the spot, it was added.

Indiana Field Conference Scheduled for May 7-9

The Second Annual Geologic Field Conference sponsored by the department of geology, Indiana University, and the division of geology, Indiana department of conservation May 7-9, will cover the upper and middle Mississippian formations of southern Indiana. Headquarters will be Spring Mill Inn, Spring Mill State Park, Mitchell, Ind. Accommodations may be reserved also at the Greystone Hotel and the Jefferson Hotel, Bedford, Ind.

Phillips Not in Purchase

Officials of Phillips Petroleum Co. have announced that the Phillips company "has no financial interest whatsoever in Republic Supply Co."

This statement was released, they said, in response to inquiries following the recent announcement of sale of Republic Supply Co. to Kerr-McGee interests.

From outside the United States came the following production and research personnel for the technical meeting at Carter Oil Co.'s Tulsa laboratories: Left to right, first row: A. D. Bell, International Petroleum Co., Ltd.; R. E. Moyar, International; G. F. Kaufmann, Standard Vacuum Oil Co.; J. W. Young, Imperial Oil, Ltd.; D. F. Layer, Imperial; O. A. Seager, Standard Oil Co. (Egypt); R. J. Watson, Standard Oil Co. (Bahamas), Ltd., and B. O. Winkler, Standard Vacuum. Second row: F. J. Amador, Creole Petroleum Corp.; K. F. Dallmus, Creole; W. D. C. Mackenzie, Imperial; A. J. Freie, Creole; E. W. Berlin, Standard Vacuum; R. H. Tschudy, Creole; A. Bles, Standard Vacuum, and M. S. Kendrick, Creole

Jersey Standard Reviews Production Research

by Kenneth B. Barnes

LATEST meeting of production research experts of Standard Oil Co. (N. J.) and its world-wide affiliates was held at Tulsa last week. The sessions for the 3-day conference took place at Carter Oil Co.'s research laboratories.

Approximately 100 technical personnel were in attendance from Carter, Humble Oil & Refining Co., Standard Oil Development Co., Imperial Oil, Ltd., Standard Vacuum Oil Co., International Petroleum Co., Ltd., Standard Oil Co. (Egypt), Creole Petroleum Corp., and Standard Oil Co. (Bahamas) Ltd.

General status of oil production research activities were discussed, with the specific subjects ranging from geology and improved oil-finding methods on through matters relating to reservoir engineering and production factors influencing increases in the ultimate recovery of petroleum. Most of the production research work of the Jersey Standard organization is handled by Carter, Humble, the Esso laboratory at Bayway, N. J., and by Creole at Caracas.

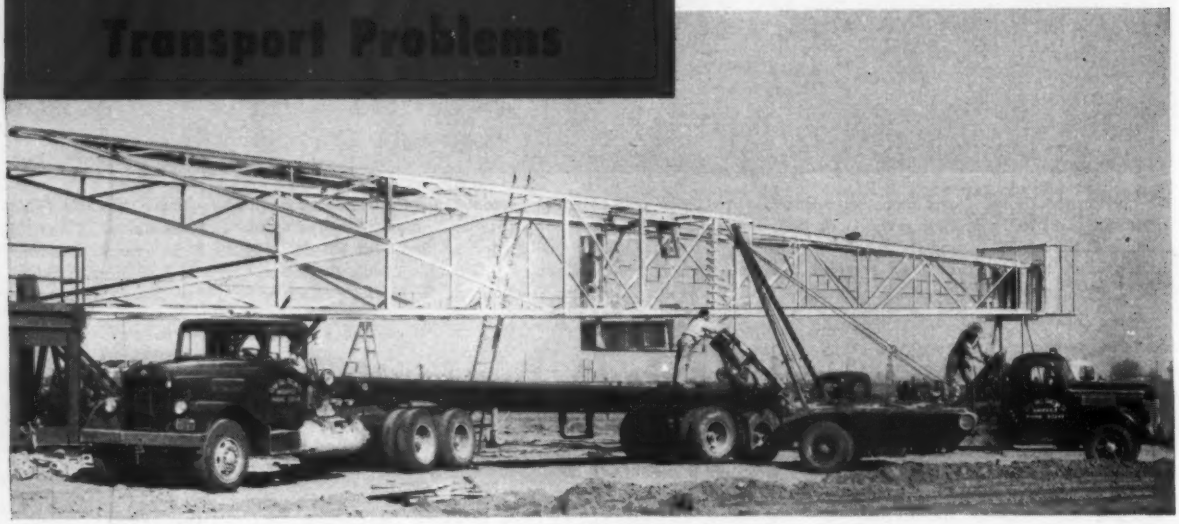
A significant statement—in view of the present so-called "shortage of oil"—was made by E. V. Murphree, president of Standard Oil Development Co., while attending the Tulsa meeting. He said that scientific exploration promises to add more than 70 billion barrels to this country's present proven crude-oil reserves of around 25 billion barrels. "This means the United States may ultimately produce 100 billion barrels more crude oil than has been produced since bringing in of the Drake well."

Murphree said the prospective discoveries probably would not be enough to supply increasing demands for oil in this country in the future. "But from a world-wide standpoint," he said, "there is enough oil in sight and enough areas giving promise of future discoveries to supply petroleum needs for many years."

The Tulsa research meeting closely followed a similar session in Caracas, Venezuela, by Creole (*see "Major Developments, 1948 Plans Discussed by Creole Engineers," The Oil and Gas Journal, March 25, 1948*) and also was along the pattern of corresponding Jersey Standard engineering conferences of 1947 and 1946 (*The Oil and Gas Journal, March 29, 1947, page 81; March 23, 1946, page 60*).

United States research personnel attending the Tulsa technical conference. Left to right, front row: W. C. Asbury, Standard Oil Development Co.; Milton Williams, Humble Oil & Refining Co.; M. C. Leverett, Humble; William Rust, Humble; D. C. Skeels, Standard Oil Co. (N. J.); W. A. Bruce, Carter Oil Co.; H. D. Wilde, Humble; W. D. Mounce, Humble; S. E. Buckley, Humble; E. M. McNatt, Carter; L. G. Weeks, S. O. (N. J.); J. F. Black, S. O. D. C., and D. H. Gardner, Humble. Second row: L. G. Howell, Humble; J. S. Larue, Humble; E. V. Murphree, S. O. D. C.; C. H. Kean, Humble; H. A. Hoberg, S. O. D. C.; H. F. Moses, Carter; D. A. Grieg, S. O. (N. J.); T. V. Moore, S. O. D. C.; W. O. Heilman, S. O. D. C.; B. O. Dimmick, S. O. D. C.; A. R. West, Carter, and J. E. Small, S. O. D. C. Back row: P. S. Williams, Carter; Bela Hubbard, S. O. (N. J.); F. W. Rolshausen, Humble; R. N. Meinert, Carter; P. H. Holt, S. O. D. C.; P. A. Dickey, Carter; Morgan Davis, Humble; J. O. Barry, Humble; W. K. Link, S. O. (N. J.); A. B. Bryan, Carter; F. G. Boucher, Carter; R. R. Thompson, S. O. D. C., and John L. Loftis, Humble

INTERNATIONAL Provides These 3 Answers to Oil-Field Transport Problems



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WASHINGTON WATCHING

BY BERTRAM F. LINZ

Give 'em to the Indians

WASHINGTON.—Norman M. Littell, one-time assistant attorney general who has sought on several occasions to intervene in the tidelands suit before the Supreme Court, has a new solution for the problem of ownership of the disputed submerged oil fields—just give them back to the 18,600 Indians of the state.

In a petition filed with the court, Littell asks that the federal Government be enjoined from making any disposition of the lands and that a receiver be appointed to manage them pending a final determination of the Indians' claim.

If Congress gives the tidelands back to the state, he warned, it may face suits for many millions of dollars from the Indians who have been defrauded of their birthright.

Littell's brief contended that while they never did anything with the tidelands, the Indians exercised complete dominion over them for 300 years under Spanish rule. He didn't say who owned them before that, but at any rate the Indians crossed them to catch seals and fish, and so attained "paramount rights" which the Supreme Court last June awarded the Government.

When gold was discovered in California, the Indians were driven from their properties, Littell said, but their forcible separation was not a relinquishment of title—so the Indians still own the tidelands. They didn't even get the price of $24 for which some smarter Indians sold the island of Manhattan to the gullible palefaces.

Should Congress pass the tidelands bill returning the property to the state, Littell declared, the California Indians would have damage claims against the Government if their contention of ownership is upheld by the court.

Defense Enters Picture

INDUSTRIAL representatives appearing before the Federal Power Commission in connection with pipeline applications have recently been bearing down heavily on the national defense aspects of an adequate supply of natural gas.

This pressure, coupled with administration plans for military expansion and security assurance, may force a change of position on elements in the commission which have been advocating the conservation of natural gas for more valuable uses than fuel.

Many industries in the East and north Middle West, where the greatest expansion of natural-gas facilities is contemplated, have told the commission that a continuous, adequate flow of gas is essential to any war program that might become necessary.

Spokesmen for these industries have pointed out that the current oil situation is uncertain and that, for the long run, the coal supply is even less dependable. In the event of an emergency, therefore, a lack of natural gas might prove disastrous, it is declared.

Last winter, some important industries were seriously handicapped by a lack of gas, a development which did not escape the notice of the National Security Resources Board, charged with the development of plans for the mobilization of industry in the event of an emergency.

In the light of the general concern over our national security, it is reasonable to expect that if the FPC displays a tendency to unduly restrict the expansion of natural-gas service, defense officials will insist that the industrial preparedness vital to the successful waging of a war takes precedence over all ideas of conserving natural-gas reserves which are increasing year by year.

"Strikes Did It"

LOSS of production by strikes in and out of the industry, rather than high demand, is cited by steel men as the basic cause of the steel shortage which has plagued the country since the end of the war.

More than 20,000,000 tons, something like 1,500,000 of it caused by the recent interruption of coal production, has been lost because of strikes, it is declared; enough steel to have placed the industry on a normal balanced supply-and-demand pattern.

Had that steel been produced, there would be no gray market and the oil industry would have escaped much of the trouble it has experienced in trying to meet demand without adequate material.

With the loss of production occasioned by the coal strike, coming on top of the Marshall plan and the military expansion program, industry spokesman say steel is now tighter than at any time in the past 2 years, and some foresee a real attempt to impose government controls after the November elections. Much will depend, they say, on the course of international events, but government planners who believe in a managed economy have powerful arguments in the present supply situation, the big demands of the oil industry and the defense program.

The steel industry also has another worry. The third increase in freight rates since last October, granted this month by the Interstate Commerce Commission, will add to rising costs, and while Big Steel has refused to increase wages and has announced price cuts which do not quite offset the increases made several months ago, the industry is not at all certain that price schedules will not have to be revised upward toward the end of the year.

Left Alone, Almost

THE administration is looking to the oil industry itself to carry out the big tanker-construction program which it has developed and unless the industry falls down on that program, and the need for additional oil-carriers becomes imperative, will not itself undertake to build any.

High government officials, however, have expressed confidence that the industry will take care of the situation in view of warnings by Max W. Ball, director of the Oil and Gas Division, that a tanker shortage may develop within a year or so and more definite estimates by the Navy Department that there will be a shortage world-wise of some 520 vessels by 1951.

The present thinking of the administration has been made clear by President Truman, himself, in a letter to Vice Admiral W. W. Smith, chairman of the Maritime Commission, concerning the $100,000,000 program which has been recommended to Congress.

"It is encouraging to note that orders have recenty been placed with American shipyards by private interests for the construction of a considerable number of tank vessels of advanced design," the President wrote. "It is to be hoped that additional orders for the construction of vessels under private account will be placed in the future and, in this connection, I wish to emphasize that I regard the government-sponsored program for merchant-ship construction as a stimulant to, rather than a substitute for, construction by private industry."

The President asked the commission to consult with the shipping industry to determine what additional construction is econonmically justified " as evidenced by willingness on the part of industry to purchase vessels constructed," but, he said, "with regard to tanker contruction, I feel that

(Continued on page 77)

"CARDWELL" EQUIPMENT

9 RIGS ON DISPLAY AT THE TULSA OIL SHOW

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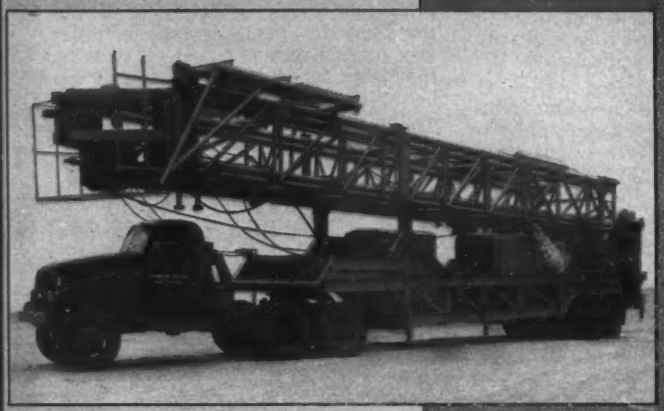

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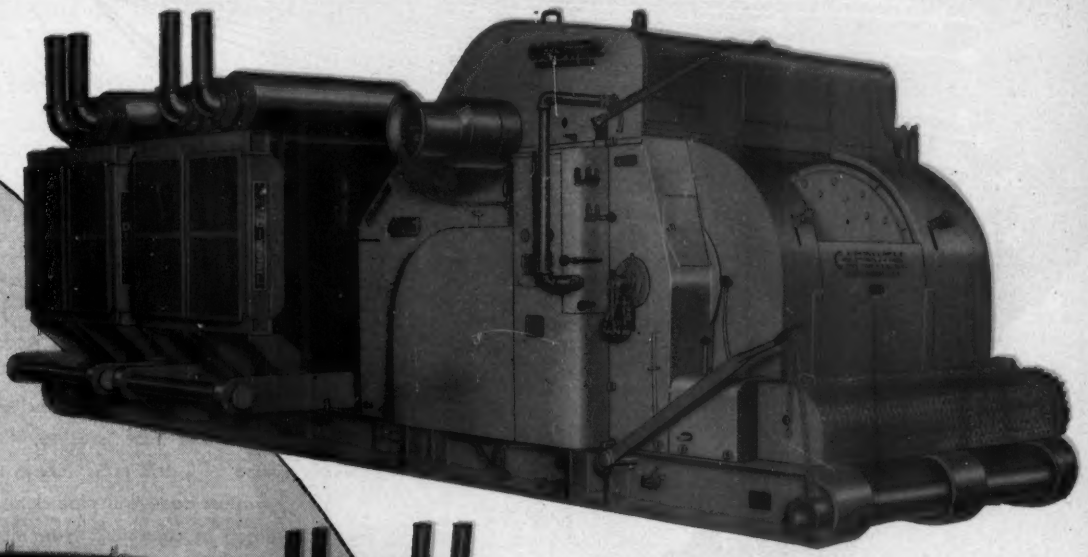
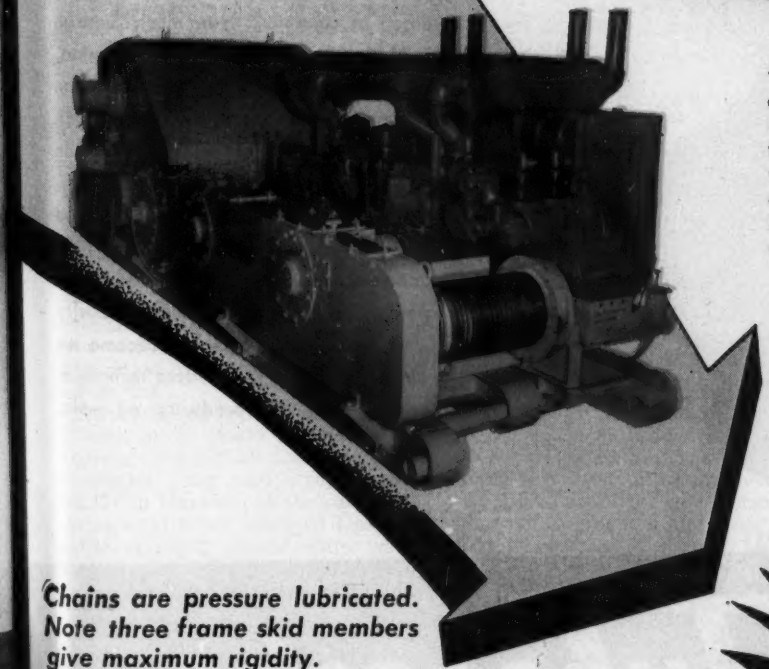
"CARDWELL" MODEL O, 8,000-FOOT TWIN-ENGINE DRAW WORKS — A FAST-OPERATING RIG — HEAT-TREATED WEARING PARTS THROUGHOUT FOR STAMINA AND TROUBLE-FREE OPERATION.





Chains are pressure lubricated. Note three frame skid members give maximum rigidity.

"Cardwell" Air-Disc clutches in both ends of drilling drum provide a high and low drive, and is operated by a single lever. Air clutches throughout. Heavy-duty chain transmission has three speeds forward and one reverse. Brakes are dual safety, self energizing, full wrap type. Hydromatic brake optional equipment. Flanges are machined and heat-treated to 550-600 Brinnell (54-58 Rockwell C) to give long life without replacement. Flanges are ground to insure maximum life of brake blocks. Rig may be transported on one truck with engines in place—is within eight-foot road limit with engines removed.

IT WILL
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TO SEE THE
"CARDWELL" EQUIPMENT
AT THE OIL SHOW

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Cable Address: "ALL STEEL," Wichita — "CARDSTEEL," New York
Wichita, Kansas, U. S. A.

OUR SPHERE IS THE HEMISPHERE

From Canada to Colombia and throughout all the fields, great and small, of the United States, Tuboscope technicians have acquired a vast backlog of experience in evaluating pipe . . . drill pipe, tubing and casing. In which areas does drill pipe deteriorate most rapidly from the effects of corrosion? How much footage can be expected from a string of pipe in the Lake Maracaibo region, or is external abrasion an important consideration when inspecting pipe which has been in use in the Gulf Coast? Having inspected millions of feet of pipe used in practically every oil area in this hemisphere, Tuboscope has the answers to these and other questions pertaining to pipe evaluation—and draws freely on this broad perception in providing for the industry a service which has become an integral part of the modern technique of drilling and producing oil wells.

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DIVISION OF

TUBULAR SERVICE & ENGINEERING CO., HOUSTON, TEXAS

Branch Offices: Beeville, Odessa, Wichita Falls, New Iberia, Shreveport, Natchez, Oklahoma City, Casper

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government participation should be limited to the cost of national defense features."

The most important feature the administration wants built into the new tankers is speed. Since, in time of war, tankers sailing light have to travel alone, a 20-knot speed would increase their security, while at the same time a 24,000-ton vessel of that speed would provide two-thirds more efficiency than present ships of the T-2 type.

Officials believe that if the Government will assume the additional cost of around $2,500,000 per ship, industry will build the desired speed into its new tankers.

Inflation for Tariffs?

THE next issue important to industry to come up in Congress probably will be extension of the Reciprocal Trade Agreements Act, asked by President Truman March 1 in a message to the House ways and means committee.

The act now is scheduled to expire June 12, and the President has recommended its continuance for 3 years "in its present form."

For 14 years, Republicans in Congress have been hammering vainly at the law, under which two presidents have whittled down the 1930 tariff act until it is only a skeleton, chopping away, among other things, at import taxes on oil. These were adopted, as a few in the industry will remember, when the United States was worrying more over high production than over high demand.

Now the Republicans are in command of Congress for the first time in that period, and they are going to make some changes in the law despite the President's assertions in his message that it has had "constant popular support and repeated congressional approval"—by White House-controlled Congresses—as a "sound method for increasing world trade" to the benefit of living standards both here and abroad.

Various members of Congress have their own ideas as to how the law should be "reformed." Some believe it should be wiped off the books, while others take the position extension would be all right provided Congress is given the right to pass on any new agreements the President enters into, and other suggestions fall in between.

Administration officials pleading for extension before the House committee are going to have a tough time, particularly in view of the blanket agreement entered into with a score of nations at Geneva last year which has not yet been outlined by the State Department in such form as to show exactly who gets what.

Louisiana Awards Leases on 152,138 Acres of Land in Gulf of Mexico

BATON ROUGE.—The State of Louisiana April 20 leased an additional 152,138 acres of its offshore Gulf of Mexico lands for oil development.

Some of the leases taken are on the southernmost limit of the 27-nautical-mile submerged coastal area over which Louisiana asserts ownership. Most of them are beyond the 3-mile line.

Purchasers on high bids at the April 20 sale by the State Mineral Board were in virtually all cases major oil companies. They paid a total of $1,792,437 in bonuses. At the same sale, the mineral board awarded leases on 94,635 acres of inland state tracts. These brought $3,152,672, making the total bonuses for both inland and offshore areas $4,945,109.

The offshore leases are in the Ship Shoal, Main Pass, South Timbalier, West Cameron, and Vermilion areas. The new awards raise the amount of Louisiana's offshore lands now under leases from about 26 to 32 per cent. The inland leases were scattered in 18 parishes.

The offshore leases went for the customary ⅛ royalty, bonus, and rental fixed by law at ½ the bonus. Some overrides were involved in the bids offered for the inland tracts. Money from the sale goes into the state general fund except for the approximately $1,000,000 received on leases beyond the 3-mile limit, which is earmarked for retirement of the state's bonded indebtedness.

The fact that the federal Government has indicated it will contest Louisiana's claim to ownership of the submerged Gulf of Mexico lands appeared to have little effect on the lease bids. A state official said Louisiana will continue to administer its "tidelands" until the government obtains an injunction and even after that if possible. The high bids received, he said, shows the confidence in the state's title and right to its Gulf lands.

Mineral board records showed the largest amount of offshore acreage was taken by California Co. with some 37,000 acres.

Stanolind Asks Permit For Drilling Platform

HOUSTON. — Another offshore location on the Texas Gulf Coast is in prospect with Stanolind Oil & Gas Co.'s application to the Army Engineers at Galveston for permission to construct a drilling platform about 1 mile south of the Galveston South Jetty, Galveston County.

The work will be carried on in water about 46 ft. deep. The company proposes to construct a steel platform 45 by 55 ft. with a deck elevation of 27 ft. above mean low water. A portable drilling rig with mast height 147 ft. above mean low water will be used.

12 Reports Scheduled at Los Angeles A.P.I. Meet

Production and drilling papers will highlight the annual spring meeting of the Pacific Coast district of the American Petroleum Institute's Division of Production, to be held at the Biltmore, Hotel, Los Angeles, May 6-7.

Production papers and speakers to be presented on the technical sessions program include:

"Limitations of Rod Pumping," K. T. McCammon, Shell Oil Co., Inc.; "A Subsurface Flow Rate Indicator and Its Application," F. M. Carlisle, International Cementers, Inc.; "Economics of Cycling Retrograde Reservoirs," Milan Arthur, Union Oil Co. of California; "A Method of Predicting Recovery of Oil by Water Flooding," R. L. Parsons and Herman Dykstra, California Research Corp.; and "Application of Secondary Recovery in United States as Related to Emergency Oil Requirements," Paul D. Torrey, consulting engineer, Houston.

Drilling papers include the following:

"Advancements in Contract Drilling," A. T. Heiser, Brown Drilling Co.; "Measurement of Mud Viscosities at High Temperatures," V. N. Bednarsky, The Texas Co.; "Progress of A.P.I. Standards," H. N. Marsh, General Petroleum Corp.; "Application of Hydraulic and Pneumatic Devices to Drilling Equipment," N. A. D'Arcy, Jr.; "Recent Diamond Coring in California," W. C. Harrington, Standard Oil Co. of California and M. C. Eastman, United States Navy, Elk Hills; "Achievement of Mobility in Drilling Equipment," W. F. Bates and J. N. Gregory, Shell Oil Co., Inc.; and "Field Results of Jet Peforator Charges," R. T. Harcuss, Byron Jackson Co.

A. C. Mattei, president of Honolulu Oil Corp., San Francisco, will report on "The Oil Industry and Politics.

Chemists to Hold Silver Anniversary Meeting

"The Professional Activities of Other Societies" will be the theme of a panel of speakers on the program of the American Institute of Chemists at its silver anniversary meeting at the Waldorf-Astoria Hotel, New York, May 7.

The evening program will be highlighted by the presentation of the Institute's gold medal to Dr. Charles Allen Thomas, executive vice president and technical director of Monsanto Chemical Co., and president of the American Chemical Society. Dr. Foster D. Snell will present the medal.

Brewster Submits Highly Critical Report on Navy-Aramco Dealings

WASHINGTON.—The Senate war investigating committee this week reported that the Government was overcharged between $30,000,000 and $38,000,000 between January 1, 1942, and June 30, 1947, on oil purchased from Arabian American Oil Co. It held that if the Navy's statement that company officials justified the price of $1.05 per barrel on the ground that Ibn Saud's royalty had increased from 21 to 42 cents per barrel was correct, "the Government clearly was defrauded because the royalty payments were not doubled."

The committee made no recommendations for action to recover any overcharge. The report was highly critical of the Navy officials who negotiated the purchases from Aramco as "far from diligent" in seeking cost records from the company, but said "the oil companies have shown a singular lack of good faith, an avaricious desire for enormous profits, while at the same time they constantly sought the cloak of United States protection and financial assistance to preserve their vast concessions."

It is estimated that the United States Government extended direct and indirect assistance to the Saudi Arabian Government in excess of $99,000,0000, of which only approximately $27,000,000 is likely to be recovered, at the instigation, for the most part, of Aramco, its affiliates, and parent companies first, in 1941, to relieve them of the requirements of Ibn Saud and, secondly, in 1943 to eliminate the danger of Aramco's concessions and earnings falling under the financial control of the United Kingdom.

Naval procurement of oil from Aramco will continue for an indefinite period, the committee commented, but from the standpoint of national defense the Arabian reserves are of dubious value and "most military opinion agrees on the probability of the destruction or capture of the Arabian oil fields by the enemy in the event of any crisis."

Submission of the report followed a Navy Department announcement last week that new contracts have been entered into with Cal-Tex Oil Products Co. at higher prices than now are being paid. In this announcement Brewster saw an "uncalled for" effort to force prices up to the Gulf level.

The Navy purchases will include 3,000,000 bbl. of Navy special during the third quarter of this year at $1.175 per barrel, and an equal volume in the fourth quarter at $1.48, as against the present price of $1.05; and 1,425,000 bbl. of Navy diesel in the third quarter at $1.805, and the same quantity the following quarter at $2.11, as against the $1.68 paid currently.

In addition, it was disclosed, the department is negotiating for 3,000,000 bbl. more of Navy special, 1,400,000 of Navy diesel, and 500,000 of motor gasoline from other companies.

The Navy pointed out that the new prices are still favorable as compared with the current Gulf prices of $2.63 for Navy special and $3.5175 for Navy diesel, and that Cal-Tex originally asked considerably higher prices.

Brewster, however, declared the new contract will mean that the "American people will pay billions of dollars of unwarranted profits for Arabian oil."

Brewster's views on the new contracts were not shared by Undersecretary of the Navy W. John Kenney, who said: "It is highly gratifying to the Navy Department to have immediately available a ready source of high-quality oil easily accessible to fleet needs, especially during a period of short supplies of gasoline and oil at home."

Next Week . . . **The Journal will report on these engineering and operating developments:**

Power pumps compounded-in-series remove pump limitations for large internal combustion engine rigs . . . and have had proven economies and efficiencies in 10,000-ft. wells in Matagorda County, Tex. A special paper gives the engineering details.

Classification and uses of plastic coatings—A Phillips Petroleum engineer offers a systematic approach to (1) evaluating the numerous available plastic coatings, and (2) selecting coatings for specific uses. Two large tables (suitable for desk mounting or reference folder filing) give complete classifications.

Jefferson Chemical Co. plant (joint enterprise by The Texas Co. and American Cyanamid) now in full operation at Port Neches, Tex.—a report by The Journal's refining editor.

Sclerograph pipe testing device gives good field results—Write-up of a new on-the-spot inspection service, by one of The Journal's Mid-Continent district editors.

New "backoff" method developed for recovering stuck drill pipe—The Journal's West Coast editor covers this operation, which has 800 successful jobs in California and portions of the Mid-Continent already back of it.

"What speeds drilling in soft formations?" Humble Oil & Refining Co. has been working on a long-range research study of drilling technique, and three Humble engineers analyze data on 26 well operations in Texas and Louisiana which were obtained to answer this question.

Compact Will Discuss Conservation Progress

Conservation progress and steps needed to insure maximum crude-oil production in keeping with the states' waste-prevention programs will receive major attention of oil-industry leaders attending the Interstate Oil Compact Commission's spring quarterly meeting in the La Salle Hotel, Chicago, May 5-7.

Gov. Beauford H. Jester of Texas, Compact chairman, will be the opening speaker on the program. Other speakers will be B. A. Hardey, chairman of the Louisiana State Mineral Board; Hiram M. Dow, Roswell, N. M., attorney and former Compact chairman; H. C. Fowler supervising engineer of the Bureau of Mines petroleum-experiment station at Bartlesville, Okla.; Jack K. Baumel, chief engineer of the Texas Railroad Commission; Gov. Dwight H. Green of Illinois; and Murray Robinson, subcommittee chairman.

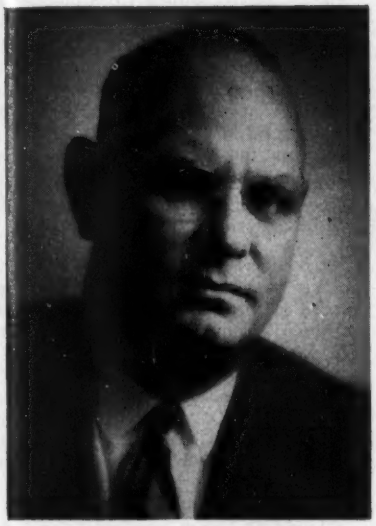
Committee studies and reports and forum discussions will review and analyze conservation progress and the future outlook of its program.

Elk Hills Gas-Storage Plan Killed by Ruling

WASHINGTON.—Plans of Southern California Gas Co. to use the Elk Hills Naval Oil Reserve for gas storage have been killed by a ruling by the Department of Justice that the Navy Department is without legislative authority to permit such use.

The company had planned to bring natural gas from Texas into the reserve for storage during times of low demand, to be withdrawn to meet peak requirements.

PERSONALS



G. H. McKay Assigned Important New Role

THE task of building and administering a new gas-transmission system in central and eastern Tennessee has been given to G. H. McKay, formerly vice president of Tennessee Gas Transmission Co., Houston.

McKay resigned from T.G.T. and took over his new duties in Chattanooga April 15 as executive vice president of East Tennessee Natural Gas Co. East Tennessee recently won a certificate from the Federal Power Commission to build a system to serve Knoxville and Chattanooga and a number of other Tennessee communities.

McKay's first experience in the gas field was with Arkansas Natural Gas Corp., which he joined as junior engineer. He is a native of Jackson, Miss., and took his civil engineering degree from Mississippi A. & M. in 1930.

He left Arkansas Natural in 1942 when he was chief natural-gas engineer, and became consulting engineer for the gas division of the Office of War Utilities and the War Production Board. From WPB he went to T.G.T. and was subsequently promoted from gas engineer in charge of gas design to manager of the sales department and later to vice president, the position he held at the time of his resignation to join East Tennessee.

Phil B. Whitaker, a member of the board of East Tennessee, pointed out that East Tennessee will take all its natural gas requirements from T.G.T. and that the new company was "fortunate in obtaining a man who can provide the cooperation necessary between the two companies."

C. E. Boone, formerly head of the land department for Amerada Petroleum Corp., has been appointed manager of the company's California division.

Jack P. Reynolds, formerly petroleum engineer with the U. S. Bureau of Mines helium plant at Amarillo, Tex., is now connected with Continental Oil Co. as laboratory technician in the company's production research laboratory at Ponca City, Okla.

John A. Jackson, formerly production geologist with Arkansas Fuel Oil Co., Alice, Tex., is now associated with **Jay Simmons,** independent producer of San Antonio.

Dr. Arthur S. Huey, formerly district geologist for Shell Oil Co., Inc., at Bakersfield, Calif., has joined Hancock Oil Co. of California to be in charge of the company's geological department for California. He will be headquartered in the main office at Long Beach.

H. W. Peabody, formerly chief geologist for Mid-Continent Petroleum Corp., has been named to the board of directors of Wilcox Oil Co.

C. G. McLaren, Tulsa area purchasing agent for Shell Oil Co., Inc., has been elected vice president of District 2 of National Association of Purchasing Agents. He will assume office at the annual convention of the organization in New York, May 31-June 2. District 2 is composed of associations in Tulsa, Oklahoma City, Dallas, Houston, Fort Worth, Texas Panhandle, Tampico, Mexico, and Wichita, Kans.

Rex E. Tarr, draftsman in the geological department for Cities Service Oil Co. at Bartlesville, Okla., has been made a scout in Panhandle field to replace **Sherril Williams,** recently sent to Calgary to make a survey of the Alberta oil lands and developments. **Don C. Griffith** has been made scout at Wichita Falls, Tex., to succeed **W. T. Minor,** who was recently transferred to the land department. **E. G. Walters** is a new scout for Cities Service at San Antonio, Tex.

James T. Rasbury, formerly director of industrial relations for the Western Petroleum Refiners Association, has been named head of the new department of industrial relations for Sunray Oil Corp., Tulsa. Prior to joining the staff of W.P.R.A. in Tulsa, Rasbury was a special agent with the Federal Bureau of Investigation.

C. A. BREITUNG

Charles A. Breitung, who has long been engaged in oil and gas development, has been named president and treasurer of an exploration company recently organized in Wichita Falls, Tex., by Breitung, **A. B. McCollum,** and **J. R. Maxey.** Breitung graduated from the University of Michigan in gas engineering and holds an honorary Doctor of Science degree from Laval University of Quebec. McCollum has been named vice president in charge of exploration for the new company. For 10 years he was geologist and geophysicist for Humble Oil & Refining Co.; geophysical director of Deep Rock Oil Co. in Tulsa; chief geologist for Southern Minerals Corp., Corpus Christi; geologist and manager of the West Texas division for Crown Central Petroleum Co. at Abilene, Tex.; and consulting geologist and geophysicist at Wichita Falls. Maxey has been named vice president in charge of operations. He has been engaged in seismograph operations for Humble Oil & Refining Co., Carter Oil Co., and Sohio Oil Co. From 1946 to early 1948 he was in Venezuela for the United Geophysical Co. as chief seismologist and supervisor of operations.

H. E. Butcher, general credit manager of Cities Service Oil Co. and treasurer of the American Petroleum Credit Association, has been named to the board of directors of the Chicago Association of Credit Men for a term of 3 years.

Arthur Lee Guy, Jr., and **Charles R. Overly,** Texas A. & M. College students, have been awarded Humble Oil & Refining Co. fellowships at the school for 1948-49.

Marion J. Moore, San Antonio, has been elected president of the South Texas Geological Society. He succeeds **Guy E. Green,** Santa Clara Oil Co. Other new officers include: **Paul B. Hinyard,** Shell Oil Co., Inc., vice president; **Maurice E. Forney,** Atlantic Refining Co., secretary-treasurer;

PERSONALS

Leland L. Palmer, of W. C. McBride, Inc., and Green, members of the executive committee; and **George E. Coates,** San Antonio independent operator, and **Robert S. Mann,** Shell Oil, district representatives to the American Association of Petroleum Geologists.

Dr. George Oenslager, retired research chemist for B. F. Goodrich Co., Akron, Ohio, and pioneer in the use of carbon black in the rubber industry, was presented the first Charles Goodyear medal by the rubber division of the American Chemical Society at its recent spring meeting in Chicago. His principal achievement in rubber chemistry was the discovery and use of organic accelerators in rubber vulcanization, which has been rated as second in importance only to the discovery of vulcanization.

George R. Hopkins, one-time assistant chief of the Bureau of Mines, has been appointed consultant to **Capt. Thomas J. Kelly,** director of the petroleum division of the National Security Resources Board. Originally with Sun Oil Co. at Dallas, Hopkins joined the bureau in 1924, leaving in 1943 to go with the Petroleum Administration for War. Later he worked on a number of reports for the American Petroleum Association.

A. L. Egnew, J. V. Lindsey, and **R. D. Monkress** are the new district land agents for Shell Oil Co., Inc., at Midland, Tex. Egnew and Lindsey moved to Midland recently from Shell's area office at New Orleans. Monkress has been in the land department at Midland.

Jeff L. Hamilton, formerly superintendent of Lone Star Producing Co.'s Chapel Hill cycling plant, has been appointed operating supervisor of the plant. **Forrest D. Ford** succeeds Hamilton as superintendent, and **William C. Gorman** has assumed Ford's duties as assistant superintendent. Headquarters for the three men will be Tyler, Tex.

H. K. McKinnon, formerly chief exploration engineer for Shell Oil Co., Inc., Odessa (Texas) division, has been named superintendent of the McCamey district, succeeding **C. A. Hull,** who has been transferred to area headquarters in Midland, Tex., to handle special assignments. **C. L. Rabe,** district engineer at McCamey, will take over as chief exploration engineer at Odessa. **Frank R. Lovering,** on special assignments in the Midland area, has been made district superintendent at Hobbs, N. M. **T. M. Ocheltree** has been transferred from Odessa to McCamey as district engineer.

Dan Pilcher, clerk in the chief scout's office at Tulsa for The Texas Co., has been made a scout in the Casper, Wyo., office of the Rocky Mountain division.

J. S. Germer, land man for Pure Oil Co., and **Bernard E. Raney,** scout for Pure, will operate from the company's new district office recently opened at Casper, Wyo.

Dr. L. F. Athy, chief geophysicist for Continental Oil Co., Ponca City, Okla., since 1936 and associated with the company for more than 23 years, has been named manager of the geophysical department. Athy, who was awarded his Ph.D. in geology at the University of Chicago in 1925, joined Continental the same year as assistant geologist, research department, Ponca Ciy, and 4 years later was named assistant superintendent, geophysical division. Other important promotions in Continental's exploration division also were announced.

DR. L. F. ATHY

H. R. Prescott, assistant chief geophysicist, has been named chief geophysicist, Ponca City, to succeed Athy. A graduate of the University of Kansas in engineering Prescott joined Continental as a junior engineer in the research department at Ponca City in 1928. He has been assistant chief geophysicist since 1939.

Dr. J. A. Culbertson, division geologist at Houston for Continental, has been promoted to assistant manager, geophysical department, at Ponca City. He joined the company in 1933 after serving as instructor in geology at Ohio and Illinois universities and for several summers with the Kentucky Geological Survey. He became assistant division geologist at Houston in 1937. Culbertson has been succeeded by **Edgar W. Kimball,** district geologist, Shreveport. Kimball, a graduate of the University of Colorado in geology, joined Continental's geological department in 1935. Prior to his promotion he had served in geological assignments at Hobbs, N. M., Wichita Falls, Tex., and Shreveport.

D. D. Christner, division geologist at Fort Worth, has been promoted assistant chief geologist, Ponca City. He joined Continental in 1924 as a geologist after majoring in geology at the University of Texas. He served over a period of years in various Texas areas becoming division geologist at Forth Worth in 1932. **W. Baxter Boyd,** district geologist, Ponca City, has been named to succeed Christner as Fort Worth division geologist. Boyd joined Continental in 1933 after several years in consulting geological work in Oklahoma City.

C. L. Arnett, Kansas district geologist, has been promoted to division geologist at Ponca City. He joined Continental in 1923 and served as a geologist in Kansas, Montana, and Oklahoma. In 1932 he was transferred to the company's geophysical department.

C. B. Pierce, of Stanolind Oil & Gas Co.'s general office in Tulsa, has been placed in charge of construction of the company's natural-gasoline plant at Elk Basin, Wyo.

Frank C. Love, attorney, has joined Kerr-McGee Oil Industries, Inc., as vice president and director and assistant to **Dean A. McGee,** executive vice president.

Claude E. Leach, geologist for Tide Water Associated Oil Co., has been named senior district geologist and assistant to the manager of the department in Los Angeles. Three other geologists who received new appointments include **A. S. Holston,** to assistant senior geologist in the Los Angeles office; **William D. Cortright,** to district geologist of the San Joaquin division at Bakersfield, Calif.; and **Harry M. Whaley,** to Santa Maria, Calif.

J. H. Chivers, geologist for Stanolind Oil & Gas Co. at Casper, Wyo., has been transferred to the company's exploration office in Bogota, Colombia.

Rex V. Phelps, chief sales engineer for the liquefied petroleum gas division of Warren Petroleum Corp., has been appointed to the recently created position of manager of Warren Maritime Corp., a subsidiary of Warren Petroleum. Phelps supervised the engineering and other details of the SS "Natalie O. Warren," first tank ship designed for the sole purpose of transporting propane as well as other liquefied petroleum gases. Formerly with the National Supply Co., Phelps joined Warren in 1940.

Harry F. Bennetts has been appointed executive secretary of the National Lubricating Grease Institute to succeed **Carl E. Bolte,** who recently resigned to become vice president of the Battenfeld Grease & Oil Corp., Kansas City, Mo.

NATIONAL BANK OF TULSA
DIRECTORS

H. G. BARNARD
Investments

A. E. BRADSHAW
President, National Bank of Tulsa

FALKNER C. BROACH
Vice-President, National Bank of Tulsa

W. A. BROWNLEE
Executive Vice-President, National Bank of Tulsa

EDWARD H. CHANDLER
Attorney-at-Law

I. A. CHAPMAN
Investments

JOHN H. DUNKIN
Vice-President and Secretary, Brown-Dunkin Company

E. I. HANLON
President, Hanlon Oil Co.

J. J. LARKIN
President, Larkin Torpedo Company

P. C. LAUINGER
President, The Petroleum Publishing Company

L. C. RITTS
President, Devonian Oil Company

A. H. ROGERS
Secretary, J. A. Chapman and H. G. Barnard

DALE R. SNOW
Vice-President, Barnsdall Oil Company

FRANK M. SOWLE
Vice-President, National Bank of Tulsa

CHARLES A. STEELE
Attorney-at-Law

C. H. SWEET
Vice-President, National Bank of Tulsa

STATEMENT OF CONDITION

April 12, 1948

RESOURCES

Cash and Due from Banks	$57,946,324.95	
U. S. Government Securities	73,443,639.24	
Other Bonds and Warrants	4,718,291.67	$136,108,255.86
Loans and Discounts		28,772,463.75
Overdrafts		5,814.15
Income Receivable Accrued		404,562.59
Prepaid Expenses		73,289.20
Stock in Federal Reserve Bank		180,000.00
Bank Premises		2,014,166.64
Customers Liability Under Acceptances		47,905.00
TOTAL		$167,606,457.19

LIABILITIES

Deposits		$156,977,169.31
Acceptances Executed		47,905.00
Income Collected, Not Earned		129,616.27
Reserve for Taxes, Interest, Etc.		440,814.37
Dividends Declared*		75,000.00
Capital—Common	$3,000,000.00	
Surplus	3,000,000.00	
Undivided Profits and Reserves	3,935,952.24	9,935,952.24
TOTAL		$167,606,457.19

*Payable—$75,000 April 15, 1948

NATIONAL BANK OF TULSA

The Oil Bank of America

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

PERSONALS

R. L. Norris, geologist, has joined Chester Oil Co. at Owensboro, Ky.

C. E. McPherson, formerly with Williams-Copeland Drilling Co., has become drilling superintendent for Fleet Drilling Co., Ada, Okla.

Edward H. Kunkel, engineer for Carter Oil Co. at Pauls Valley, Okla., has been transferred to Oklahoma City.

Robert B. Chapman, engineer for Carter Oil Co., has moved from Effingham, Ill., to Tulsa.

George Nolley, formerly supervisor of crude-oil purchasing of Cities Service Oil Co. for northwestern Oklahoma, has been made representative at Fort Worth. He will cover southern Oklahoma and northern Texas.

John Overbey, landman for Standard Oil Co. of Texas at the Midland, Tex., office, has resigned to become an independent. He has been succeeded by **Frank L. Houghton, Jr.,** formerly in the Houston headquarters office.

L. B. Berry, well scout for Shell Oil Co., Inc., has been transferred to the crude-oil department as crude-oil scout.

Dwight F. Benton was elected president of Root Petroleum Co. at the company's recent annual meeting. Other officers named were **H. Canon, R. L. Aycock,** and **Joe Hyer,** vice presidents; **T. E. Beaird,** secretary; and **A. L. Reid,** treasurer. Directors named include: **D. P. Hamilton, Ralph Brandon, Jennings B. Hamblen,** Benton, and Canon.

H. C. Hall, foreman for Stanolind Oil & Gas Co., has moved from Chandler to Oklahoma City.

Roy M. Smith, division manager for Cimarron Petroleum Co., Houston, has been elected president of the company to succeed the late Robert Bowles. Smith will continue to make his residence at Norman, Okla.

Thomas W. Pew, president of General Crude Oil Co., Houston, has been elected to the board of directors of Transcontinental & Western Airlines.

T. S. Petersen, Standard Oil Co. of California, has resigned from the general marketing committee of the American Petroleum Institute marketing division. He has been succeeded by **E. J. McClanahan** of Standard Oil Co. of California. **K. W. Yeates,** Wasatch Oil Refining Co., has resigned from the lubrication committee and **James D. Moyle** of Wasatch has been named to succeed him.

SHIFTS—

Edward C. Sandberg, engineer, Richfield Oil Corp., Tupman to Bakersfield, Calif.; **H. H. Rushing,** superintendent, Rocky Mountain Drilling Co., Whittier to Fillmore, Calif.; **O. E. Martin,** engineer, Phillips Petroleum Co., Andrews to Odessa, Tex.; **V. E. Karnes, geologist,** Karnes Core Drilling Co., Beaumont, Tex., to Minot, N. D.; **Cecil A. Colville,** superintendent, Sun Oil Co., Dallas to Corpus Christi, Tex.

P. K. Landtiser, engineer, Atlantic Refining Co., Dallas to Odessa, Tex.; **Robert A. Neath,** engineer, Humble Oil & Refining Co., Encino to Luling, Tex.; **C. O. Miller, III,** engineer, Tide Water Associated Oil Co., Fort Worth to Houston; **B. G. Hubner,** engineer, Atlantic Refining Co., Gainesville, Tex., to Comanche, Okla.; **W. Marshall Black,** engineer, Humble Oil & Refining Co., Houston to Pleasanton, Tex.; **John H. Garner,** engineer, Republic Natural Gas Co., Lubbock, Tex., to Hobbs, N. M.

Julian K. Quinn, engineer, Gulf Oil Corp., Luling to Houston; **C. G. Gerber,** foreman, Shell Oil Co., Inc., Notrees to Andrews, Tex.; **W. H. Mills,** engineer, Stanolind Oil & Gas Co., Pampa, Tex., to Tulsa; **Fred Nash, Jr.,** engineer, Shell Oil Co., Inc., Quitman to Houston; **C. C. Dye,** engineer, Stanolind Oil & Gas Co., Woodsboro to Beaumont, Tex.

J. M. Hughes, foreman, United Gas Pipe Line Co., Crowley to Ansley, La.; **Jack M. Fillman,** engineer, Shell Oil Co., Inc., Houma, La., to Houston; **Keith Lindley,** engineer, Barnsdall Oil Co., Patmos, Ark., to Jennings, La.; **Frank J. Ells,** superintendent, Socony-Vacuum Oil Co., Inc., Woodbury to Brooklawn, N. J.; **Robert G. Kurtz,** engineer, Ohio Oil Co., Findlay, Ohio, to San Antonio, Tex.; **L. K. King,** foreman, Continental Oil Co., Altus, Okla., to Sonora, Tex.

W. K. Neish, foreman, The Texas Co., Havre, Mont., to Gillette, Wyo.; **Don E. Evert,** engineer, Union Oil Co. of California, Cut Bank, Mont., to Whittier, Calif.; **S. I. Betzer,** engineer, Phillips Petroleum Co., Oklahoma City to Shidler, Okla.; **Alvin E. Hall,** engineer, Phillips Petroleum Co., Pawhuska to Bartlesville, Okla.; **Paul S. Pustmueller,** engineer, Fremont Petroleum Co., Ventura, Calif., to Denver, Colo.; **C. L. Sparkman,** superintendent, Humble Oil & Refining Co., Maringouin to Franklin, La.; **William Harris White,** geologist, California Co., Morehead to Richmond, Ky.; **Martin L. McGee,** superintendent, Vickers Petroleum Co., Oklahoma City to Midland, Tex.

DEATHS

W. R. Thawley, 56, chief scout for Gulf Oil Corp, died April 24 in Tulsa. Thawley joined the company about 25 years ago in Tulsa when it was Gypsy Oil Co.

Joseph Walter Betts, district sales representative for Gulf Refining Co. for the past 37 years, died April 20 in Waxahachie, Tex.

Amson J. Tuggle, 61, Hearne, Tex., pipe-line inspector who had been with Texas Pipe Line Co. for 39 years, died April 17.

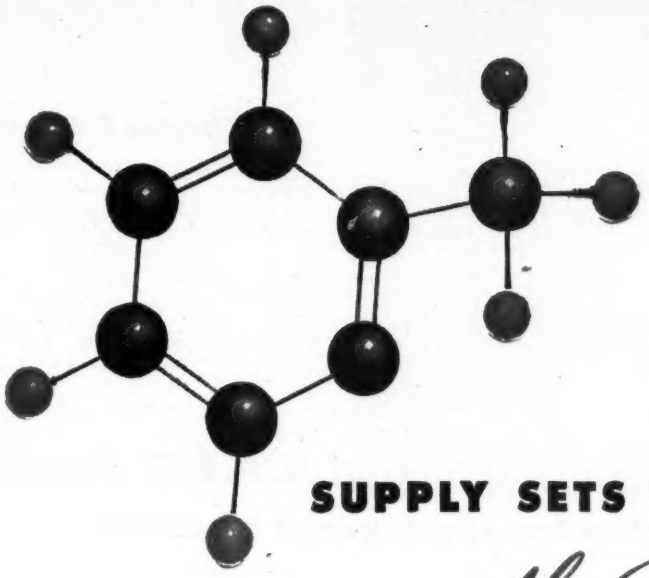
John M. Graves, 62, pioneer Oklahoma oil well driller, died April 20 in Tulsa.

Joe Simmons, 60, independent Texas oil operator, died April 22 in Refugio, Tex. Formerly field superintendent for Houston Oil Co. of Texas at Haynesville, La., and for Shell Oil Co., Inc., in West Texas, Simmons became an independent operator when East Texas field was opened in 1930.

William S. Bloomer, 52, connection foreman in the pipe line-department of Johnson Oil Refining Co. at Cleveland, Okla., died April 19 in Cleveland.

George N. Foggan, 72, former Pennsylvania oil operator and inventor of oil well equipment improvements, died April 14 in Petersburg, Fla.

EXPLORATION SECTION STARTS NEXT PAGE →



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the Search for Oil...

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by Charles J. Deegan

STUDY OF Ancient Sedimentology

will occupy attention of A. A. P. G. Research Committee for some years to come

Research work on recent and near-recent sediments having been recommended as a job for the A.P.I. by the Institute's experts, the A.A.P.G. is gathering its forces for an organized research program on ancient sediments.

GEOLOGICAL research will continue to be one of the major activities of the American Association of Petroleum Geologists for some years to come. The report of the retiring chairman of the research committee, Dr. Shepard W. Lowman, and the suggestions of the new chairman, Dr. John T. Rouse, make that quite clear. The new executive officers of the association are as keenly interested as their predecessors in supporting the work of the committee. Moreover, the suggested fields of activity for future study are expected to enlist even greater enthusiasm and support among the whole membership than in the past. This hope may well be realized, despite the fact that the research activities of the past 2 years resulted in great interest and substantial contributions in work, suggestions, and approval from literally hundreds of individual members.

Te situation at present is divided into two phases, the first of which is now beyond A.A.P.G. control. The board of directors of the American Petroleum Institute has before it a recommendation from the A.P.I. Committee on Fundamental Research on the Occurrence and Recovery of Petroleum. If this recommendation is approved, a preliminary appropriation will be made to prepare specific research projects. These specific projects would be part of an integrated frontal attack on the sedimentology of recent and near-recent deposits. The integrated program will probably involve expenditure of at least $200,000 per year for several years.

Dr. John T. Rouse, regional geologist Magnolia Petroleum Co., incoming chairman of the A.A.P.G. research committee

The second phase, now in a formative stage, is the result of a tentative decision by the A.P.I. Committee on Fundamental Research. That committee decided that, for the time being at least, it would recommend to the Institute that work on ancient sediments should be left to the individual companies and geologists, while the Institute's activity should be concentrated on recent and near-recent sediments. The A.A.P.G. research committee and the individual members are now working on plans to develop a widespread program of individual and study group research in the field of ancient sediments.

Marine Research

In connection with the project now before the A.P.I. board of directors, the United States Navy made a proposal at Los Angeles in 1947. Comdr. Roger Revelle of the Office of Naval Research introduced a memorandum in the A.A.P.G. research committee sessions as a basis for discussion. In effect this proposed the establishment of a marine research laboratory, or oceanographic institute on the Gulf Coast, as an activity of Rice Institute or some other educational institution. This would be similar to those now existing on the Pacific Coast at Scripps Institute, and on the Atlantic Coast at Woods Hole. While such a laboratory would have far greater scope than the study of recent sediments, it would serve as a perfect base for the type of studies proposed in the research into recent and near-recent sediments.

The Navy proposed to supply an

ocean-going ship of the VMS or AMC type, and several 100-hp. diesel boats, probably the 38-ft. buoy boats with 12-ft. beam, power-winch equipped, which had been found satisfactory at Scripps Institute. In addition the Navy offered to contribute $50,000 per year toward the budget, provided the remaining funds (estimated at $50,000 to $100,000 per year) were contributed by some other group.

The three objectives cited by the Navy as its reasons for this offer were:

1. To increase the number of scientists familiar with oceanographic techniques and with the nature of the scientific problems of the sea, in order to build up a reservoir of scientists for a possible future defense emergency.

2. Additional knowledge of the properties of the sea bottom and the overlying water is necessary in many aspects of surface and subsurface warfare. Among these are problems associated with underwater sound, mine warfare, and *atomic defense.*

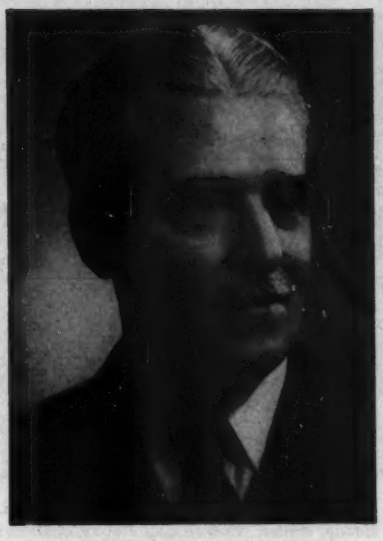
3. To increase the fund of knowledge of petroleum geology to sharpen the tools needed for the discovery and recovery of petroleum, the life blood of the Navy.

Interested parties point out that in the year that has passed since the first proposal, none of the incentives to the Navy has become less urgent. In fact, they say that the present international situation would seem to make all of them far more urgent today than could have been anticipated a year ago.

New Marine Problems

Moreover, it is pointed out that developments within the past year have also given the petroleum industry added incentives for the establishment of such a laboratory. Seismic operations now involve difficulties with the politically powerful fishing interests, particularly the shrimp and oyster people. Justly or not, operations of the petroleum industry will be blamed for all fluctuations in the relative abundance of marine life, and a flood of lawsuits for damages threatens. A marine laboratory might well solve the causes of the changes in abundance of marine life and save the petroleum industry a substantial amount of money.

As drilling and development proceed, these observers say other problems arise that are subject to attack by such a laboratory. On drilling platforms, the effect of wave action and the various combinations of effects to be anticipated over a wide range of wind velocities, local bottom conditions; and tide stages are important items in the cost. Once production is found, all of these things



Dr. Shepard W. Lowman, research laboratory, Shell Oil Co., Inc., Houston, retiring chairman of the A.A.P.G. research committee

have to be dealt with over a period of years. There also follow problems of surface corrosion of equipment; attacks on below water supports by various types of marine organisms; and last, but by no means least, water-pollution problems on an entirely new large scale.

The argument proceeds then that developments of the past year have intensified the needs of both the Navy and the petroleum industry for the establishment of some kind of a marine research laboratory along the Gulf Coast. The value to the petroleum industry, they say, has now progressed far beyond that to be expected from a sedimentology research program alone. Moreover, the new incentives to the industry are said to be more immediate and urgent than the long-range program of sedimentology research. However, following this line of reasoning, these people anticipate that some sort of a sedimentology research project will accompany the work of the new laboratory. The establishment of the laboratory itself, they regard as inevitable.

Next Step for A.A.P.G.

The most probable line of attack on the second phase of the A.A.P.G. program, the only part now within its control, was first indicated by Dr. Rouse, the incoming research committee chairman, at the St. Louis regional meeting January 15, 1948. In that meeting he reviewed the situation up to the submission of the question to the board of directors of the A.P.I. Then he stated the question and his suggested answer follows:

"The A.A.P.G. research committee has been holding all projects in abeyance until the A.P.I. decided which portions of the sedimentology program they wished to consider. Now the A.A.P.G. is free to go to work on any or all of the programs dealing with pre-Pleistocene sedimentary rocks.

"The most important question before us is: What is the A.A.P.G. going to do? The committee feels that the association now needs the cooperation of all local geological societies in formulating and completing a constructive and concrete attack on that part of the sedimentology program which deals with pre-Pleistocene sedimentary rocks. Such a program would involve a detailed study of specific Paleozoic, Mesozoic, and Tertiary formations on the outcrop and in the subsurface over wide areas. It is readily apparent that it would be extremely difficult to make a study of this kind without the active work and cooperation of the local geological societies."

Membership Reaction

The response since January to that proposal has been most gratifying to the members of the research committee. It has apparently touched off considerable enthusiasm, and has resulted in numerous offers of help and statements of willingness to assign manpower to specific proposals of the committee. Discussing this trend, in an exclusive interview for The Oil and Gas Journal, the following statement was made jointly by A.A.P.G. President Paul Weaver and Dr. Rouse:

"During the coming year, the research committee will continue its cooperative effort with other groups in fundamental research, but has in mind doing more along the line of collecting special information on certain geologic formations from its members.

"It has been the practice of many members of the association to make themselves specialists in some one aspect of exploration. In preparing articles for the association, in the form of case histories on oil fields and geologic formations, limitations of space have prevented, in many cases, presentation of data bearing on problems of fundamental research. It is the hope of the research committee that these data can be prepared and given a place *in the over-all picture of finding oil on new structures.*

"The research committee realizes that this is a very large program, and completion and correlation of such is not a matter of weeks or months. Response received at the regional meeting in St. Louis to the idea of such a program was very gratifying, and showed that those members present would endorse such a program if it be formulated in the meetings of the research committee and discussion with the membership at the Denver meeting."

Retiring executive committee, A.A.P.G.: Earl B. Noble, past president; George S. Buchanan, vice president; Carroll E. Dobbin, president; J. V. Howell, secretary-treasurer; Clarence L. Moody, editor. Howell and Moody, reelected this year, and Dobbin as the new past president, will also be members of the incoming executive committee along with Paul Weaver and Roy M. Barnes, incoming president and vice president respectively

Meeting of Three Exploration Societies Draws 2,500 Attendance at Denver

DENVER.—The joint meeting of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists, and the Society of Economic Paleontologists and Mineralogists has attracted an attendance of over 2,500 scientists. The attendance and the numerous technical sessions, as well as the large number of committee meetings reflect the fact that this year the petroleum industry will probably spend a half billion dollars on exploration for oil (including wildcat drilling).

The scope of the exploratory sciences and their application is best indicated by what happened on Wednesday. On Wednesday morning, the A.A.P.G. was holding a technical session at the Shirley Savoy Hotel; the S.E.G. had two separate technical sessions going in different rooms at the Cosmopolitan Hotel; and the S.E.P.M. had a technical session going on in the Broadway Theater. In the afternoon, S.E.G. cut its program to one technical session, and the others maintained one each.

Committee sessions started on Sunday. On Monday the A.A.P.G. opened up the registration, and also scheduled a field trip during the day. The S.E.G. held a business meeting and then started in with two sets of technical sessions in different rooms, both morning and afternoon. On Monday evening, Sen. Antonio J. Bermudez, director, Petroleos Mexicanos, addressed a general meeting on the subject of "Mexican Oil." This was followed by a talk on synthesis of liquid hydrocarbons from western coals by V. E. Parry of the U. S. Bureau of Mines.

These were, in a sense, only the preliminary phases, as the formal opening of the joint convention was held on Tuesday, under the auspices of the local hosts, the Rocky Mountain Association of Geologists. After

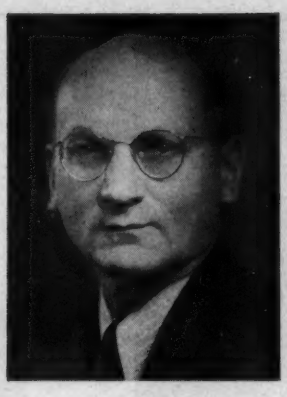
PAUL WEAVER
Incoming president, A.A.P.G.

ROY M. BARNES
Incoming vice president, A.A.P.G.

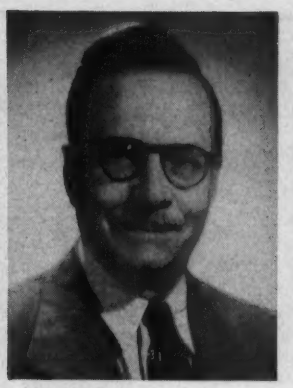
R. DANA RUSSELL
Incoming president, S.E.P.M.

J. B. GARRETT, JR.
Incoming vice president, S.E.P.M.

J. V. HOWELL
Reelected secretary-treasurer, A.A.P.G.



H. B. STENZEL
Reelected secretary-treasurer, S.E.P.M.



C. L. MOODY
Reelected editor, A.A.P.G.

M. KING HUBBERT
Reelected editor, S.E.G.

addresses of welcome by the mayor of Denver, Hon. Quigg Newton, and the president of R.M.A.G., Clarence E. Manion, members of the three exploratory societies listened to the presidential addresses of Carroll E. Dobbin of A.A.P.G., Cecil H. Green of S.E.G., and James A. Waters of S.E.P.M.

Then followed the honors awards. The Sidney Powers Memorial Award of A.A.P.G., the highest honor it bestows, was awarded to A. I. Levorsen, widely known petroleum geologist, and head of the school of mineral sciences at Stanford University. The award was made "in recognition of distinguished and outstanding contributions to, and achievements in, petroleum geology."

Hugh D. Miser, geologist of the United States Geological Survey, Washington, was presented with a certificate of "Honorary Membership" in A.A.P.G., the highest membership honor in the association. Only 30 geologists have received this award during the 30-year history of the association. The certificate citation

(Continued on page 109)

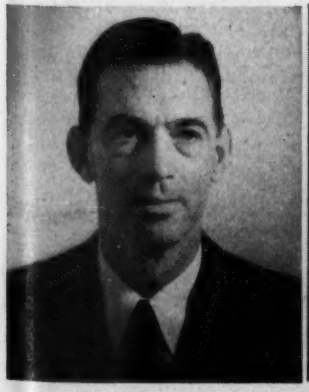
T. A. MANHART
Retiring secretary-treasurer, S.E.G.

S.E.G. CANDIDATES

Right and below are the candidates for election to office in the S.E.G. Mail ballots are opened and the results announced in the business meeting. For final results, see regular news section in fore part of this issue of The Oil and Gas Journal

L. L. NETTLETON
Candidate for president, S.E.G.

JOHN H. WILSON
Candidate for president, S.E.G.

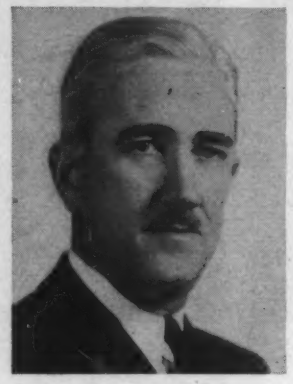


W. J. OSTERHOUDT
Candidate for vice president, S.E.G.

ANDREW GILMOUR
Candidate for vice president, S.E.G.

A. E. McKAY
Candidate for secretary-treasurer, S.E.G.

E. V. McCOLLUM
Candidate for secretary-treasurer, S.E.G.



CARROLL E. DOBBIN
Retiring president,
A.A.P.G.

CECIL H. GREEN
Retiring president,
S.E.G.

JAMES A. WATERS
Retiring president,
S.E.P.M.

The Presidents Speak

Social Trends in Science

by Carroll E. Dobbin

IN general, there have been three stages in man's relation to society: First, that in which certain men had the right to exploit other men—slavery, serfdom, and the like; second, the right of each man to receive rewards from society proportional to his contributions thereto, and third, the present stage of spreading foreign "isms" that teach and practice, more or less, the dialectic materialism of Marx and Engels.

Science and Society

The golden ages of democracy have always been the brilliant ages of genius, when man was relatively free and his confidence and creative instinct were unrestrained. The Greece of Pericles in 431 B.C., was the apex of a golden age or artistic, intelligent, and material achievement and speculative science that flourished in a democratic civilization scarce attained since—a society of intellect and liberty in the West that had conquered materialism and despotism in the East.

Rome, the conqueror, conquered in turn by Greek culture, suffered the social and economic schemes of Julius Caesar (100-44 B.C.) and his successors, who, like some others since, seemingly ignored the results of previous similar drastic measures. Democracy degenerated into tyranny, all civil liberties were destroyed in totalitarianism, and the western world plunged for 1,000 years into the intellectual stagnation of medievalism.

Rejuvenated in the Renaissance, democracy contributed in the sixteenth and seventeenth centuries the beginnings of an age of experimental science that marched gradually through and over entrenched ignorance, misconception, prejudice, and the fallacies of ancient myth and error to the present spectacular scientific and industrial age.

The announcement by Copernicus that the earth revolves around the sun and that man is not at the center of the universe produced the greatest consternation in certain quarters, and marked a new epoch in human thought. The philosophies of Descartes and Newton, and the theories of Darwin and Einstein stimulated equally great revolutions in human understanding, and now comes the new science with its promise of incredible advances. In other words, science has often turned the pages of human history but in turning the present page it must challenge vigorously those forces that seek false liberty and security at any cost and especially by the misuse of the contributions of science.

Administration

Superior scientific administrators will analyze and act constructively upon their many new opportunities and responsibilities, in order to control the impact of accelerated science upon society and to improve and maintain our secular culture, for science alone cannot handle the new forces; in fact, the success of these administrators and their organizations will depend to a large extent on their knowledge of most phases of human nature. They will investigate the proper role of government in subsidizing science; they will plan for a greater and more prosperous science, even though some scientists adhere to the bedrid argument that planning violates the dignity of science; they will know at least the fundamentals of business management, in order to apply their technical equipment effectively; they will assist in overcoming human gullibility and general ignorance; they will know that they are not omnicompetent and will work closely with culture and religion in improving spiritual and temporal relations, emphasizing the basic virtues

of science, namely, scrupulous honesty; they will know that sovereignty in science, that is, internal regulation and external independence, with the hand of cooperation extended to all, can, when aggressively and positively maintained, be of supreme service.

Politics

Past events prove that science must be more familiar with politics in order to determine the kind of treatment it will receive in an increasingly complicated social setup featured by closer interdependence. In other words, science is performing mightily but is floundering somewhat in the midst of potential plenty at a time when the bulkhead between science and politics is weakening. As has been proposed often, scientists should inform the public of their worth and works and be more active in public affairs, so that a stabilizing influence against pressure groups will be provided and science will be no longer the party of the second part.

As Ralph Waldo Emerson wrote, politics rests on necessary foundations and cannot be treated with levity: in fact, according to the American Association for the Advancement of Science, science has been in politics since March 3, 1863, when politicians created the National Academy of Sciences to advise the Government on scientific functions and to confound the men of Europe.

In the age when nations are propagandizing by wholesale, scientists and engineers, who make a fetish of precision in special knowledge, often derail their thoughts by a deplorable bungling of words, and especially so now when persuasion is almost a lost art. The satisfaction gained by speaking and writing good English more than requites the effort spent in learning it.

Geologists and Society

As chairman of the committee on applications of geology of this association, I urged at the annual meeting of the American Institute of Mining and Metallurgical Engineers in New York City, February 17, 1941, that the worth and works of geologists and geophysicists be advertised vigorously to appreciative and influential laymen. It has been very gratifying since, therefore, to see the increased interest in and recognition of these practitioners of earth science under the stimulus of aggressive leadership within and closer relations with each other and with other scientists and engineers. Indeed, it is a supreme satisfaction to see the seriousness and maturity of mind evinced, as never before, by most prominent men.

Geologists, unlike other physical scientists, have no long, outstanding record as developers of new, dynamic, and fruitful scientific concepts. They are, however, reviewing their dogmas critically; they are refusing to scatter their force by subscribing to the blindman's bluff game of conformity, consistency, and custom, even though, like most great scientists of old, they may be misunderstood; they are casting off their peculiar ivory tower; they are conscious of their greater responsibilities in guiding geological education; they are endeavoring to revitalize and unite geology by creating a single, strong, and aggressive geological agency, such as the American Institute of Physics; they are beginning to enlighten the hungry public and to formulate social policies; they are advising instruction beyond basic training, such as courses in cultural and social sciences; and they are examining all major trends much more critically than heretofore.

As Emerson wrote, "There is a time in every man's education when he arrives at the conviction that envy is ignorance; that imitation is suicide; that he must take himself for better or worse as his portion; that though the wide universe is full of good, no kernel of nourishing corn can come to him but through his toil bestowed on that plot of ground which is given him to till. The power which resides in him is new in nature, and none but he knows what that is which he can do, nor does he know until he has tried."

In tilling their plot of ground—the history of the earth and its life as recorded in rocks—geologists utilize the tools of all natural sciences in the grandest and sublimest of all settings—the outdoors. It is, therefore, averred that they are especially and peculiarly endowed by training, experience, and vision to supplement their fundamental scientific researches by leading aggressively, impartially, and soundly in the cultivation of that social field, the crop from which will be an advanced and stable society featured by the power and prestige of scientists and engineers.

Some of the past presidents of A. A. P. G.:

Front row: Wallace E. Pratt (1920); J. Elmer Thomas (1917); Earl B. Noble (1946); E. L. DeGolyer (1925); Max W. Ball (1923); Middle row: A. I. Levorsen (1935); G. C. Gester (1927); A. R. Denison (1943); Alexander Deussen (1918); Ira H. Cram (1944) Back row: M. G. Cheney (1945); Frank R. Clark (1933); F. H. Lahee (1932); Ed. W. Owen (1941)

Integration in Exploration

by Cecil H. Green

THE ratio of annual production versus proved reserves is an important indicator of condition. In the domestic oil industry we have been able to do no better than to maintain a near-constant value for this index over the 11-year period from 1937 through 1947, even though the total expenditure for exploration—leases, geological and geophysical work plus wildcat drilling—has increased more than four times during the same period.

Looking to the future—it is at least conjectural, whether or not we shall be able to maintain the same ratio of annual production versus proved oil reserves for a similar new period by the sole process of increasing 1937 expenditures another four times.

Actually, such an accomplishment is probably dependent upon the strategy of following several other avenues, as well as this one of increased effort; for example:

1. To discover an extensive new province, such as the Continental Shelf, which we are now entering.

2. To effect distinct improvements in the performance of present geophysical apparatus.

3. To improve the integration of existing exploration methods.

It appears more necessary than ever to direct our thinking towards sharpening present exploration tools and to better coordination of their use. The effectiveness of future exploration programs would seem to depend upon how well we can combine good instruments and capable people.

Of these two, capable people are the more important. This is indicated by the diversity of talents required in the following exploration pattern.

First, if our field efforts in a particular region are to count for much, we must have direction. This means that logical inspiration must first be provided by a digest of geological background information in combination with all available and pertinent geophysical data. The accuracy, and hence the value of such preliminary information, is completely dependent upon the caliber and practical experience of the men performing this coordination work. They must be more than pure geologists or geophysicists, they should be a combination of both. Because of the time required to obtain experience, these dual attributes are not likely to be found in high degree among men of junior rank.

The field geophysicist may point to the list of oil and gas fields for which he can claim credit. However, credit must often be shared with geological-geophysical coordinators, whose planning and authority originated the projects.

It can truly be stated that the easily found structures or anomalies have been discovered already in most domestic oil provinces, so any extensive oil-finding campaign must include marginal areas in point of workability. To obtain the highest degree of positive results in the future, the geophysicist will be more than ever dependent upon a management which can supply skilled guidance, supported with patience and fortitude.

The actual conduct of the field program is no less important than its planning. Here also, mental caliber, experience, and coordination of talents are of paramount importance. Key personnel are required for three functions. These are management of the party, interpretation of geophysical data, and geologic orientation. In seismograph operations separate men may be required to fill adequately these three roles. In fact, there are often field circumstances where fewer than three men would be expensive in terms of results.

Geologic Orientation Needed

The feature of geologic orientation is particularly important. By being fully apprised at the outset regarding the geologic premise for entering the particular area, the instrumentation and computing techniques can be adjusted best to cope with the anticipated problems, at least as they are initially conceived. In serving as a liaison between the party chief (or seismologist) and the management-exploration staff, the geologic observer can contribute information which may indicate the proper solutions for unexpected difficulties. Furthermore the field program can be changed immediately as results begin to modify, or even disprove the initial hypothesis.

It is natural to assume that major undiscovered pools lie concealed in regions which so far have yielded an unusable variety of geophysical data. The Delaware basin of West Texas, the Michigan basin, and the Tejon Ranch area of California are prime examples for the seismograph at least. So a third unit in the exploration organization is assuming increasing importance, a liaison research and engineering department between the field and the geophysical laboratory.

Two examples from the reflection seismograph illustrate the function of this liaison department and its range of interest. First, basic field research could involve studies of sonic-wave propagation with a view to accomplishing a reduction in the ratio of disturbance to reflection energy, or for improving the ability to resolve more closely spaced reflections, etc. Second, engineering effort would continue to focus upon improving electrical characteristics of the recording system.

Review Section Needs

A final and equally important link in the exploration organization is the review section, wherein all forms of exploration data are consolidated. This entails the amalgamation of information from a wide variety of sources. It could include geologic interpretations from outcrops, core drilling, electrical, radioactivity, and density logs from deep wells, and geochemical evidence, all combined with various geophysical reports.

Here again, the personal factor is important, since the effectiveness of such effort is dependent upon qualities of wide experience, imagination, and skill. The review section chief should have a direct connection to exploration management, so as to have a voice in shaping the course of further exploration, or development, as the case may be. Because of this relationship, he should appreciate the importance of making a forceful presentation of data.

It follows that review work must be considered for each area as often as a new control is added. Here is an opportunity for the man with a curious and imaginative turn of mind. He can recast a previously indeterminate piece of geophysical evidence in the light of some new supplementary data. The resulting hypothesis could create the best lead for a fresh geophysical investigation. Without such a review section, one might say that a few oil fields are "lost" in the files.

The future effectiveness of the exploration industry, say 10 years hence, is dependent upon the caliber and training of university graduates who are now entering the profession. Looking back 10 years or more, we recall that geophysical work possessed the lure and romance of a new profession, plus a compensation differential high enough above the average industrial level to overcome any hesitation. Today, exploration geophysics does not possess these two inducements. So, we are doing an average job of competing for desirable new personnel. I have heard the question asked, "Why should a man elect to move around in a situation of difficult housing, when he can obtain easily a position in one place in

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many other lines of engineering endeavor, and for about the same gross income?"

Fortunately, there seems to be a growing realization that incompetence in geophysical interpretation is costly at any price, while in contrast, an alert, resourceful, and experienced geophysicist can be cheap at almost any price.

Recognition of the importance of integration to effective exploration is reflected in the activities of the Society of Exploration Geophysicists. First, is the compilation of a new cumulative index of our journal geophysics. second, a campaign to accumulate over 50 geophysical case-history papers, covering a wide range of producing fields, has been successfully completed. This collection will appear next fall in Volume 1 of a proposed Geophysical Case History Series. Third, I would make special mention of the organization to date of six local sections: Tulsa, Dallas, Houston, Shreveport, Fort Worth, and the Los Angeles-Bakersfield area.

Geologist's Cooperation

There is a need to develop men who are competent in both geology and geophysics. Geophysicists have benefited greatly from local section meetings and distinguished lecture tours of the A.A.P.G. If, as a consequence, the average geophysicist knows more about geology than the average geologist about geophysics, then here is our opportunity to offer recompense. The S.E.G. local sections are created at a time when exploration geophysics seems to be fast losing the aspect of secretiveness. The pooling of common knowledge and experience is started already.

To stimulate interest and to further understanding of the common ground between geology and geophysics, the suggestion has been made that joint field trips should be organized and conducted by experienced geologists and geophysicists. On these trips, the emphasis should be placed on structure and lithology, rather than on the details of stratigraphy and nomenclature. Certainly by such collective efforts the art should progress much faster than by separated endeavors.

No one can deny that the exchange of ideas on instrument design, which has been carried out over the years among geophysical research men, has been of great benefit to the exploration industry. However, there is also the aspect that novel suggestions, leading to advancements of more radical character, might be derived from sources anywhere in the broad field of electronics. With this thought in mind, the S.E.G., in conjunction with the American Institute of Electrical Engineers and the Institute of Radio Engineers, is forming a liaison committee to survey the applications of electronics to exploration geophysics.

It is evident that exploration efforts should be united upon a single wide base instead of continuing to follow separated channels of mining and petroleum. Therefore, it is the hope of the society that this first joint meeting with the mining specialists, which is held appropriately in Denver, will initiate a permanent working relationship for the benefit of all exploration.

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Stratigraphy and Paleogeography of Lower Catahoula-Frio Formations

by James A. Waters

THE search for new oil fields in the United States has increased in intensity since the close of the last war. The technologists are applying all available tools in this search, and the extended use of the results of the study of well samples is an essential part of this program. It is apparent that a much more detailed analysis will be required of the material gathered than in the past. It is believed that the field work for the micropaleontologist-stratigrapher is still in its infancy.

This paper prepared on the lower Catahoula-Frio formation, from whose strata 194 fields in Texas have produced approximately 1,400,000,000 bbl. of oil to January 1, 1947, and in whose known fields large reserves still remain to be produced, indicates that we are still not agreed on the age classification of the formation. In beds bordering other geosynclines similar problems in stratigraphy undoubtedly exist.

The area under discussion extends from Alabama to northeastern Mexico, and is limited to the section from uppermost Vicksburg (Oligocene) beds to the base of the Marine Catahoula. (Marginulina zone restricted, Heterostegina and Discorbis foraminiferal zones). Heretofore, the age classification of this section has been accepted by many geologists as Oligocene. The writer, by stratigraphy, develops information that leads him to conclude that the lower Catahoula-Frio beds are Miocene in age, and are not of the Oligocene.

The importance of the Vicksburg flexure in deposition of beds of the Frio is emphasized. The great thickness of deltaic sediments in the Frio is pointed out, and the ease with which miscorrelations of this section may be made, by means of electric logs and paleontology, is stressed. The transgressive seaward overlap permits a faunal development to carry through an abnormally long range and the electric-log sections can easily be misinterpreted. Younger lithological units may be erroneously correlated with older lithological units by means of the electric logs.

Meeting of Three Exploration Societies

(Continued from page 101)

stated it was in recognition of his "distinguished service to the cause of petroleum geology."

The A.A.P.G. "President's Award," in recognition of the most significant geological article published in the Bulletin during 1947 by authors under 35 years of age, went to L. L. Sloss and W. M. Laird, of Northwestern University and North Dakota Geological Survey respectively. Their joint paper "Devonian System in Central and Northwestern Montana" was selected as the winner. The cash award of $100 was divided equally between the recipients, and each given a specially worded certificate.

On Tuesday afternoon another joint session of all three societies was held. This was a technical program of papers having a common interest to all exploration scientists. Wednesday was the heaviest schedule of the week, as previously referred to, with four technical sessions in the morning and three in the afternoon.

On Thursday, the A.A.P.G. and S.E.P.M. held technical sessions in both morning and afternoon. The S.E.G. which had started its technical sessions a day earlier than the other two, held a field inspection trip that lasted all day. Leaving early in the morning, they spent the forenoon inspecting the laboratories of the U.S.G.S. Topographic Branch and the U. S. Bureau of Reclamation at Federal Center, west of Denver. After a lunch at the Center, the afternoon was devoted to inspection of the geophysical laboratories at Colorado School of Mines, in nearby Golden. That evening, the formal sessions ended with a dinner dance, western style, attended by members and wives.

On Friday, many members stayed over for the two field trips that had been arranged. A 2-day trip covered the Colorado Springs and Canon City areas. Another trip, a 3-day schedule, traveled to Glenwood Springs, Rifle, and vicinity, returning via Leadville.

As is customary, a substantial portion of the program of the geologists was devoted to papers on the region in which the meeting is held. With the exception of D. B. Layer's paper on Leduc field in Canada most of the Rocky Mountain papers dealt with broad phases of regional geology. C. J. Hares' paper on the "Orogeny of the Rockies" attracted considerable interest, as did E. M. Spieker's paper on "Orogenic Record of Central Utah," and R. L. Heaton's "Mesozoic and Late Paleozoic History of Colorado and Adjacent Areas." Carrying this same regional tinge were several other papers. A. A. Baker, J. W. Huddle, and D. M. Kinney collaborated on "Paleozoic Geology of the North and West Sides of the Uinta Basin, Utah"; H. D. Thomas dealt with "Regional Stratigraphy and Structure of Wyoming"; L. L. Sloss reported on "Tectonic Control of Paleozoic Sedimentation in the Montana Area"; and H. W. Scott on the "Age of the Amsden Formation in Montana and Wyoming."

A. I. Levorsen, recipient of Sidney Powers Memorial Award of the A.A.P.G.

The convention arrangements were handled by the following members of the general committee:

Thomas S. Harrison, chairman; A. E. Brainerd, cochairman; N. W. Bass (also chairman, A.A.P.G. program committee); L. Brundall, (also cochairman, hotels and housing committee); R. D. Copley; A. W. Cullen (also cochairman, registration committee); K. C. Forcade (also chairman, service detail committee); D. B. Gould; C. A. Heiland (also chairman, local S.E.G. program committee); S. H. Knight; S. W. Lohman; C. E. Manion (also president, Rocky Mountain Association of Geologists and chairman, entertainment committee); Robert McMillan (also chairman, registration committee); B. H. Parker (also president, Colorado School of Mines); F. M. Van Tuyl (also cochairman, field trips committee); and P. G. Worcester (also cochairman, field trips committee).

In addition, the following served as chairmen or cochairmen of other committees: K. L. Gow, cochairman, entertainment; H. E. Christensen, chairman, and C. R. McKnight, cochairman, exhibits; J. W. Vanderwilt, chairman, E. S. Shaw, cochairman, W. O. Thompson, cochairman, field trips; H. W. Oborne, chairman, J. M. Kirby, cochairman, finance; C. E. Lavington, chairman, hotels and housing; J. H. Johnson, chairman, local S.E.P.M. program; E. W. Scudder, chairman, V. Z. Smith, cochairman, reception; E. G. Hurd, cochairman, service detail; George R. Downs, chairman, J. H. Turner, cochairman, transportation; H. M. Crain, chairman, R. H. Volk, cochairman, publicity.

COMMITTEE MEETINGS

Sunday

5:00 p.m.—S.E.G. nominating committee.
8:00 p.m.—A.A.P.G. research committee.

Monday

2:00 p.m.—A.A.P.G. and S.E.G. education committees jointly with Geological Society of America education committee.
9:00 a.m.—A.A.P.G. publications committee.
9:00 a.m. to 5:00 p.m.—A.A.P.G. research committee.
10:00 a.m.—A.A.P.G. applications of geology committee.
10:00 a.m.—A.A.P.G. exploratory - drilling-statistics committee.
10:00 a.m. to 5:00 p.m.—A.A.P.G. business committee.
Time not set—A.A.P.G. finance committee.
Time not set—A.A.P.G. revolving publication fund committee.
Time not set—A.A.P.G. trustees of research fund.
Time not set—A.A.P.G. Boy Scout literature committee.
8:00 p.m.—Joint S.E.G. council meeting.

Tuesday

8:00 a.m.—A.A.P.G. geologic names and correlations committee.
4:30 p.m.—A.A.P.G. Mesozoic subcommittee.
5:00 p.m.—A.A.P.G. Cenozoic subcommittee.

Wednesday

8:00 a.m.—A.A.P.G. Paleozoic subcommittee.
2:00 p.m.—A.A.P.G. distinguished lecture committee.
4:15 p.m.—S.E.P.M. council meeting.
8:15 p.m.—Joint executive committee meeting; A.A.P.G.-S.E.G.-S.E.P.M.

Thursday

11:20 a.m.—S.E.P.M. business meeting.

HUGH D. MISER *L. L. SLOSS* *W. M. LAIRD*

Miser was elected to position of honorary member, by A.A.P.G., and Sloss is coauthor with W. M. Laird, of paper that won President's Award of A.A.P.G.

DIGESTS

EXPLORATION SOCIETIES' ANNUAL MEETING

On this and the following several pages are presented digests of most of the papers presented before the annual meetings of the A.A.P.G., the S.E.G., and the S.E.P.M. Meetings were held at Denver, April 26-29.

Leduc Oil Field, Alberta, a Devonian Coral Reef Discovery

D. B. LAYER, research geologist, and member of staff, Imperial Oil, Ltd., Calgary, Alta.

LEDUC oil field, a major discovery in 1947, is situated near the center of the province of Alberta. The discovery well, completed in February 1947, was located on the basis of seismic work carried out by a Heiland Research Corp. crew for Imperial Oil, Ltd. By February 1, 1948, 37 wells were producing 4,470 bbl. of oil a day under government allowables. All wells are flowing. The extent of the field has not been defined, but extension wells have indicated a probable area of at least 8,100 acres, with an estimated recoverable reserve in excess of 106,000,000 bbl.

With the exception of exposures of Upper Cretaceous continental beds along stream channels, the entire area is covered with glacial drift. In the stratigraphic section drilled to date in Leduc field, only two periods, the Cretaceous and Devonian, are represented. Cretaceous beds are both marine and nonmarine and range in thickness from 4,250 to 4,500 ft. The total drilled thickness of Devonian beds is 2,700 ft., composed of dolomite, limestone, shale, and anhydrite.

Gas with noncommercial quantities of oil is present locally in the Viking member of Upper Cretaceous age and in sands near the base of the Lower Cretaceous. Small occurrences of gas and oil are found in the upper part of the Devonian. The main producing zones are dolomites of Upper Devonian age and are locally called the D-2 and D-3 zones. These occur at depths ranging from 4,850 to 5,400 ft., 500 to 900 ft. below the top of the Devonian. The D-3 zone, both from its innate characteristics and its regional aspects, appears to be a coral reef. The D-2 zone is rich in coralline material but is a blanket-type deposit maintaining an almost constant thickness but variable porosity over a broad regional area.

It is too early in the development of the field for a clarification of the structural picture, but the accumulation appears to be due both to stratigraphic and structural-trap conditions.

The oil from both zones is similar in character. It is paraffin-base crude oil with a produced gravity of 39° A.P.I. The solution gas-oil ratio of the D-2 zone is 630 cu. ft. per barrel for stock-tank oil and 760 cu. ft. per barrel for the D-3 zone.

Development is proceeding rapidly, and, as of February 1948, one year after discovery, 20 rigs were in operation. Spacing is set by the provincial government at 40 acres per well, with twin wells drilled in each 40 acres where both zones are productive.

The coral-reef characteristics of the main producing zones are stressed in the paper.

Paleogeography of the Northern Part of the Permian Basin of West Texas and Southeastern New Mexico

JOHN M. HILLS, consulting geologist, Midland, Tex.

A SERIES of paleogeographic maps is presented showing the extent of Permian seas in the South Plains area of West Texas and the eastern portion of New Mexico. Special emphasis is laid on the character of the seas of early Permian time and the nature of the pre-Permian surface over which these seas advanced. Some new evidence bearing on the age of the San Andres group is presented.

Zonation of the Frio Formation Of Southeastern Texas

FRANK REEDY, JR.

RECENT development in the Gulf Coast of Texas has indicated the productive possibilities of many of the sands composing the major portion of the thick Frio formation of Oligocene age. Exploration to the deeper sands of the Frio discloses facts of depositional conditions of these sands, which are as critical as structure for the accumulation of petroleum. The area comprising northern Jefferson County and Orange County is herein taken as a unit. Upon the basis of electrical-log correlations with all available paleontological data of wells which have drilled below the top of the Frio, a proposed plan for the zonation of the Frio formation is herewith presented.

To substantiate this zonation, electrical log, strike, and dip sections have been constructed indicating the basis for the correlations, the lithologic character of each of the zones of the Frio formation, and the calculated isopach interval of each zone. To interpret accurately these correlations and apply the zonation for a structural basis, three isopach maps have been constructed. These isopach maps indicate the extent of the sands, their depositional position, and the development of the shale wedge.

The results of this study of the present evidence suggests a threefold zonation of the Frio formation; upper Frio, consisting primarily of sands; marine middle Frio, a shale wedge; and lower Frio, consisting of sands and shale. The presence of the offshore bars and reentrant basins is recognized from the isopach maps. Local thinning is evident in areas of structural uplift. The variation in stratigraphic position of certain faunal associations is noted to be due to ecological changes, primarily that of the encroachment of updip sands into the marine shales causing the faunal position to move seaward and higher in the geological section.

It is believed that this proposed zonation of the Frio formation will give a clearer insight into the nature and character of the Frio formations and can be effectively extended through other countries of the Texas Gulf Coast.

The Occurrence of Oil in the Arbuckle and Ellenburger Formations of the Mid-Continent Area

JOHN G. BARTRAM, EDWARD F. SHEA, and WILLIAM C. IMBT, Stanolind Oil & Gas Co., Tulsa, and Midland, Tex.

THE Arbuckle formation of Cambro-Ordovician age has been a most important producer of oil in Central Kansas for many years, and the Ellenburger formation of nearly equivalent age is now being actively developed in West Texas and southeastern New Mexico and is yielding many new and very large pools. It is interesting that oil and gas have accumulated in these two widely separated areas, generally under different geological conditions, and in a wide intervening area few pools of much importance have been developed. These different conditions will be shown by regional structure and isopach maps and by cross-sections.

It is hoped that the paper will encourage discussion on those areas that have failed to produce in the Arbuckle and Ellenburger, and also on deeper possibilities in the same formation.

The Golden Trend of McClain and Garvin Counties, Oklahoma

ROBERT M. SWESNIK, geologist, Anderson-Prichard Oil Co., Oklahoma City.

THE Golden Trend of South-Central Oklahoma is located principally in western McClain and Garvin counties, Oklahoma, within the southeastern embayment of the Anadarko basin, bounded to the east by the Nemeha-Pauls Valley uplifts, and to the south by the western Arbuckle Mountains.

Although broad, gentle warping and truncation occurred during Hunton, Mississippian, and early Pennsylvanian time, the great orogenic movement that originated the Arbuckle-Wichita structural system occurred in post-Morrow-pre-Deese (Des Moines) time with northwest en echelon faults formed as adjustments to the westward-plunging arches. The descent into the southeastern embayment of the Anadarko basin is accomplished by the successive down-dropping of fault blocks with the basin axis directly aligned with the northwest-trending Mill Creek graben of the exposed Arbuckle Mountains.

Approximately 15,000 ft. of pre-Deese sediments were locally truncated in the highest areas to expose the basement complex. The region was eroded to approach base level and was later strongly down-warped to initiate the Anadarko basin and permitted onlap of the Deese sediments, which reached a probable maximum thickness of 3,500 ft. in the deeper basin areas to the west and lapped out completely on the Pauls Valley uplift. This progressive marine onlap was further modified by the preservation of scarps where faults were rejuvenated, so that areas of abrupt thickening and thinning occur where the invading seas failed to reduce to basal level the relief across fault blocks. Recurrent movements continued into later Hoxbar time, but in contrast to the pre-Deese faulting only minor warping occurred in the succeeding Pennsylvanian redbeds.

Oil production is found in rocks varying in age from Permian to Ordovician, and 22 oil fields are described in some de-

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tail. The main producing formations are various Deese (Pennsylvanian) sandstones, upper (Devonian) and lower (Silurian) Hunton limestone, Viola (Ordovician) limestones, and several formations of the Simpson (Ordovician) group. Several pools produce from the Simpson group in structural traps, but the majority of the pools in the area produce from Deese sandstones in stratigraphic traps formed by these sandstones as they successively lap out upon the Pauls Valley uplift. Here the geologist has had an unparalleled opportunity to find stratigraphically trapped oil, and by subsurface studies he has been able to direct exploration to this end.

Pennsylvanian Stratigraphy and Structure, Velma Pool, Stephens County, Oklahoma

W. W. MALLORY, Phillips Petroleum Co., Bartlesville, Okla.

A THICK cover of Permian rocks at Velma pool (Stephens County, Oklahoma) makes the study of the highly disturbed pre-Permian rocks a subsurface problem. An interpretation is presented based on sample logs made by Paul Bertram.

The site of Velma pool during the Pennsylvanian failed to sink as rapidly as adjacent portions of the Anadarko-Ardmore geosyncline. About 5,000 ft. of sediments comprising the Springer, Dornick Hills, Deese, and Hoxbar formations were deposited, while much greater thicknesses accumulated in lower areas. Minor unconformities occur at the top of the Springer and the top of the Deese formations. Major orogeny occurred at the close of Hoxbar deposition.

A central area between Velma and West Velma pools was bowed upward and closely folded by lateral pressure. Continued pressure created a large subsidiary fold on the east flank of the central high. The subsidiary structure was in turn closely folded and thrust upward against the central autochthonous mass.

Beveling of the Velma structure accompanied flank deposition of red shale and limestone in Virgil time. The entire structure was subsequently buried during the Permian by 1,000 to 2,000 ft. of Pontotoc and Clearfork-Wichita redbeds.

Paleotectonic and Paleogeologic Maps of the Central and Western Part of North America

A. J. EARDLEY, professor of structural geology, University of Michigan, Ann Arbor.

A SERIES of 11 paleotectonic maps and 5 paleogeologic maps presents the evolution of the central and western part of continent from early Paleozoic time to late Mesozoic. They cover the western Cordillera from Central British Columbia and Alberta south to Central Mexico, the central stable region east to Lake Michigan, and the Mid-Continent and Gulf regions. The tectonic maps propose to show for each period or partial period of time (1) the belts of severe compression and igneous activity, (2) the regions of epeirogenic uplift that were subjected to erosion, (3) the areas which received less than 1,000 ft. of sediments, and (4) the basins and troughs that subsided and received more than 1,000 ft. of sediments. The basins and troughs are contoured in 1,000-ft. intervals. In summary, the tectonic maps show the crustal movements for each period concerned. Tectonic elements are emphasized, whereas the type of map known as the paleogeographic emphasizes shorelines and commonly obscures tectonic elements.

The series of paleogeologic maps starts with the outcrop pattern of the continent at the close of the Devonian and presents views of its developing complexity in the middle Pennsylvanian, at the close of the Permian, at the close of the Triassic, and at the close of the Jurassic. Both the tectonic and geologic maps seem necessary to gain an adequate understanding of the major geologic elements of the continent.

In certain areas much detail had to be lumped together; in others hazardous interpretations had to be drawn. The purpose of the paper is to present the maps as preliminary copies, and to ask for assistance in correcting and adding to the data they show.

Geology of the Rocky Mountain Front Ranges in the Vicinity of The Bow River, Alberta

L. M. CLARK, Shell Oil Co. of Canada, Ltd., Calgary, Alta.

THE front ranges of the Rocky Mountains in the vicinity of the Bow River, Alberta, represent a very fine example of the thrust-fault type of structure, which characterizes the eastern part of the Canadian Rockies. The ranges consist largely of repeated sequences of Paleozoic strata dipping about 40° west and separated by subsequent valleys eroded in Mesozoic or Upper Paleozoic beds. Strata ranging in age from Cambrian to Upper Cretaceous are exposed within the area. The map area is traversed by the Calgary-Banff highway as well as by the main line of the Canadian Pacific Railway and, although visited by many geologists since the 1880's, has not heretofore been mapped.

Age of the Amsden Formation in Montana and Wyoming

HAROLD W. SCOTT, professor of geology, University of Illinois, Urbana.

THE boundary line between the Mississippian and Pennsylvanian systems in Montana and Wyoming is usually placed somewhere within the Amsden formation. A Fusulinid fauna from Montana indicates a Morrowan age for the lower Amsden in that area. The fauna is characterized by the presence of large numbers of Millerella in association with Endothyra sp., Bairdia, Cytherella and Polytolites.

The upper Amsden is conformable to the overlying Tensleep quadrant, and the limestones of the former usually grade into the sands of the latter. There is evidence in all areas of continuous deposition from Amsden into Tensleep time. A large hiatus separates the Amsden from underlying strata except in geosynclinal areas.

The faunal and physical evidence points to a Pennsylvanian (Morrowan) age for the true Amsden. Strata occurring in geosynclinal areas and occasionally classified as Amsden are probably not equivalent to the Amsden on the foreland area.

Mesozoic and Late Paleozoic History of Colorado and Adjacent Areas

ROSS L. HEATON, U. S. Bureau of Reclamation, Denver.

THIS paper is essentially a revision of paleogeographic maps prepared in 1933 and 1937. Since the so-called ancestral Rockies had a profound effect on late Paleozoic and Mesozoic sedimentation in much of the area outside Colorado, the areas discussed extend over much of the Rocky Mountain region.

The revisions in the Permian and Pennsylvanian are comparatively slight and consist mostly of the elimination of some islands in Utah and a union of the Zuni and Defiance positive elements in New Mexico and Arizona. Some minor changes are made along the edges of the Front Range and San Luis positive areas.

Only slight changes are made in the Lower and Upper Triassic maps. Quite profound changes are made in the new Jurassic maps. The Navajo-Nugget sandstone is extended much farther east across Wyoming and questionably into the Black Hills of South Dakota. The Carmel-Twin Creek map is also extended, recent work having established the presence of Middle Jurassic and early Upper Jurassic over a larger area than that shown on the earlier maps. The sandstone facies of the Entrada becomes more shaly, silty, and predominantly red toward the west and is so shown. The Curtis marine beds and their equivalents are shown as having a marginal extension to the east and south, consisting of evaporites and shales. The Morrison map is not radically changed.

Former maps by the author of four stages in the Cretaceous are revised, using data from several sources but more especially from Preliminary Map No. 10 of the Oil and Gas Investigations Series by Dr. Reeside of the U. S. Geological Survey.

Eastern limits of some individual sandstone wedges are added from maps by the author made in 1937.

Certain Relationships Between Geology and the Production Pattern in the Rocky Mountains

MAX L. KRUEGER, chief geologist, and PENN L. GOOLDY, assistant geologist, Rocky Mountain Division, Union Oil Co. of California, Laramie, Wyo.

CERTAIN relationships between the cartographic pattern of Rocky Mountain oil fields and certain geologic and other factors are shown isographically. These include (1) the gravity of oil produced from, the indicated ultimate productivity of, and the effective structural filling from the different-aged producing horizons involved, and (2) the over-all thickness of sedimentary rocks and the percentage of marine beds involved in the Mesozoic and Paleozoic section. The percentage of structurally trapped oil to stratigraphically trapped oil in the Rocky Mountain region is also estimated.

Gas for the Future

GAIL F. MOULTON, staff geologist, The Chase National Bank, New York.

THE growth of sales of natural gas has been one of the outstanding industrial developments of the United States during the past 25 years. During this period the estimated reserves of natural gas have been increasing at an even more rapid rate. Pipe-line projects approved by the Federal Power Commission indicate a sudden increase in the use of natural gas for the period just ahead. To maintain the comfortable ratio of gas reserves to sales enjoyed by the industry in the past important additional reserves will have to be discovered.

The large sedimentary basins, remnants of more extensive areas of deposition, are the loci of geologic conditions necessary for important accumulations of oil and gas. In the successful exploration of these basins, the role of the geologist in interpreting well data for the correlation of deeply buried strata far from outcrop and in directing exploration to areas of favorable depositional facies of potential reservoir beds will be of the utmost importance.

The status of exploration and prospects

for further discoveries of 33 important basin areas in the United States are briefly discussed in the paper. On the basis of available data, of those basins which are adequately explored so that geologic conditions are fairly well established, the Anadarko, Midland, and Gulf embayments offer the greatest promise of discovery of substantial reserves. Of these, the Gulf embayment, defined as including the area from beyond the Rio Grande to the east side of the Mississippi Delta and including the tidelands area, is believed to have the greatest prospects. Accordingly, it appears that in the future, as at the present, more than half of the gas reserves of the United States will be in fields situated in Texas.

Tectonic Control of Paleozoic Sedimentation in the Montana Area

L. L. SLOSS, Department of Geology, Northwestern University, Evanston, Ill.

ISOPACHS and quantitative lithofacies maps of selected stratigraphic intervals in Montana and adjoining states and provinces make possible the delineation of the positions and times of activity of a number of tectonic elements that have influenced Paleozoic sedimentation. Certain elements, notably the complex of linear troughs called the "Cordilleran geosyncline," the Sweetgrass arch, and a broad shelf flanking the northwest side of Siouxia, were apparently inherited from Proterozoic time. During the cycle of deposition involving Cambrian, Ordovician, and Silurian, the Sweetgrass arch remained relatively inactive, and the Williston basin area was only moderately negative in tendency. Pre-late Devonian uplift of the Sweetgrass arch caused widespread stripping of Silurian and Ordovician strata, but during late Devonian sedimentation the arch was again inactive. In early Mississippian time, carbonate deposition was widespread except in the active geosynclinal area, and the Williston basin reached full definition, culminating in the precipitation of Meremacian evaporites. A new cycle of intracratonic clastic deposition was initiated in the late Mississippian, reaching a climax in the Pennsylvanian, and reflecting activity of positive elements to the south. Permian sedimentation was influenced by a number of local tectonic conditions and is represented by a great variety of lithofacies. The present distribution of Paleozoic rocks in the area has been limited by uplift and renewed erosion on the Sweetgrass arch in pre-Middle Jurassic time.

Regional Stratigraphy and Structure of Wyoming

H. D. THOMAS, professor of geology, University of Wyoming, State Geologist of Wyoming, Laramie.

WYOMING is characterized by major mountain axes, which divide the state into intermontane basins. The mountains are mostly anticlinal in nature and most are modified by thrust faults. The basins are complex synclines. Structural trends are generally north-south, but there are east-west-trending folds and faults. These structures are the result of Laramie folding, which began late in Cretaceous time and continued into Tertiary time.

Paleozoic rocks represent all systems from Cambrian to Permian, except Silurian. Paleogeographic features and depositional environments differed during each period. Mesozoic rocks of Triassic, Jurassic, and Cretaceous age are present in all parts of the state. Basin filling was begun with the inception of Laramie folding, and continental sediments from Paleocene to Pliocene in age were deposited.

DIGESTS OF S. E. G. PAPERS

Correlation of Gravity Observations With the Geology of The Coal Creek Serpentine Mass, Blanco and Gillespie Counties, Texas

FREDERICK ROMBERG, LaCoste & Rombert, Austin, Tex., and VIRGIL E. BARNES, Bureau of Economic Geology, University of Texas.

GRAVITATIONAL observations were made of the pre-Cambrian Coal Creek serpentine mass in Blanco and Gillespie counties, Texas, the geology of which had been mapped previously. The observed gravitational anomalies indicate roughly the depth of the serpentine mass, below which it may possibly grade in to its parent peridotitic rock. Probable small-scale correlations between the gravitational map and the geology of the area is indicated.

Residual Gravity in Theory and Practice

W. RAYMOND GRIFFIN, Research geophysicist, Robert H. Ray Co.

A PRECISE definition of residual gravity is given and in a form most suitable for numerical application. Some pains are taken to show that the residual gravity picture one obtains depends on the method used in obtaining it and that there are many ways in which this may be done. Several examples from actual work on developed oil fields are given in the form of figures and maps to bear out the above statement. Conclusions are drawn as to the relative order of sensitivity of several factors entering into the computations in determining a given residual picture. Factors considered in this paper are (1) size of unit figure, (2) kind (or shape) of unit figure, (3) density of reference net, i.e., number of reference points per unit area, and (4) sensitivity of reference points to lateral displacement on gravity map.

Use of the Light Airplane In Geophysics

J. W. HORN, Garrett Exploration Co., Dallas.

A LIGHT airplane has been found to have several uses in geophysical work. It has been found to be both effective and economical for scouting prospective areas and areas under survey. In some areas supervision can be greatly expedited. It has been found very useful for transportation of personnel, equipment, and supplies where time is the important factor. The plane can be used to maintain close contact between the field office and central office with an appreciable saving of time. It has been used in special emergencies and in one case perhaps saved a man's life. The most useful plane is one with a top cruising speed of approximately 100 m.p.h., a minimum safe cruising speed of about 65 miles m.p.h., and a landing speed of about 45 m.p.h. Total cost of operation of such a plane, with moderate flying time, has been found to approximate the cost of the same transportation by automobile.

A New Light-Weight Portable Gravity Meter

KENNETH E. BURG, Geophysical Service, Inc., Dallas.

A NEW light-weight portable gravity meter of unique design is described, wherein many limitations previously encountered in such an instrument have been overcome. The basic requirements of such an instrument are outlined and the design methods used to meet these requirements are disclosed. Test and performance data are presented.

Theory of Low-Pressure Electromagnetic Fields

H. M. EVJEN, Elflex Co.

BASED directly on Maxwell's field equations, the extremely low end of the frequency spectrum may be reduced in first approximation to simple potential theory. The approximation theory is borne out by some field experiments, the results of which are presented. Agreement with the theory, however, requires that the ground have a very large effective dielectric constant. This conclusion is supported by previous observations by a number of independent observers. Thus the relaxation time has been found to be extremely great in samples of mud as well as in observations directly on the ground, and the sign of an electric anomaly over a relative insulator, such as crystalline salt or gas and oil, invariably has been found to be negative. Both of these observations can be explained in terms of a very great dielectric constant. The value yielded by the present experimental work is of the order of 10^{10}.

Electrical Surveys Of Salt Domes

WILLIAM BRADLEY LEWIS, Elflex Co., Houston.

SURVEYS were made of the Long Point and Brookshire (San Felips) domes using the Elflex method. The anomalies mapped showed excellent agreement with known subsurface geology.

Survey of the Haynesville Salt Dome, Texas, by Telluric Currents

ERIC BOISSONNAS and EUGENE G. LEONARDON, Schlumberger Well Surveying Co.

THE fact that natural currents flow through the ground has been known for quite a long time. Some of these currents are local in character; some involve the whole of the earth's surface. These latter currents are called telluric currents. Their behavior and properties are outlined in general, and their usefulness for the practical purpose of geophysical exploration is discussed at length. In conclusion, an example of actual survey by telluric currents on the Haynesville salt dome (Texas) is given, which illustrates the quality of the results which can be obtained in similar cases.

Microstructure and Behavior Of the Sediments I. Classification

EUGENE McDERMOTT, Geophysical Service, Inc., Dallas.

THE sediments may be usefully described in terms of three primary kinds of atomic configurations (microstructures). Subsurface fluids are also described. This may be called a first step in the direction of understanding the anatomy and physiology of the sediments.

Microstructure and Behavior Of the Sediments II. Experimental Geophysical Data

F. E. HAGGERTY, GALE WHITE, and EUGENE McDERMOTT, Geophysical Service, Inc., Dallas.

SOME experimental geophysical data are presented bearing on the changes the sediments under the influence of forces of short and long-time duration.

Microstructure and Behavior Of the Sediments III. Experimental Geochemical Data

W. R. RANSONE, E. C. REAGOR, and EUGENE McDERMOTT, Geophyhical Service, Inc., Dallas.

SOME experimental geochemical data are presented bearings on the changes that take place within the relatively more fixed basic anatomy of the sediments.

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Microstructure and Behavior Of the Sediments IV. Some Theoretical Considerations

EUGENE McDERMOTT, Geophysical Service, Inc., Dallas.

SOME theoretical considerations are offered for the purpose of indicating connections between the observed behavior of the sediments and the basic microstructure of the sediments. On the basis of a rational frame of reference various directions of needed research are pointed out.

Recent and Current Highlights Of Geophysical Exploration

DR. M. M. SLOTNICK, Humble Oil & Refining Co.

SOME of the newer techniques of geophysical exploration such as the offshore work in the Gulf of Mexico, the work on the Edwards Plateau, and the use of airborne magnetometer are discussed. Of the newer ideas the use of telluric currents, acoustic-impedance and well logging are mentioned as examples. Finally a brief resume of a nonstatistical nature of worldwide geophysical activity is presented.

Some Technical Aspects of Bahamas Airborne-Magnetometer Survey

HOMER JENSEN, Aero Service Corp., Philadelphia.

THE Bahamas airborne-magnetometer survey, discussed last year as a project about to begin, was completed in November. As a large-scale, coordinated application of the airborne magnetometer, Shoran, and other new electronic devices, this survey illustrates most of the problems and techniques involved in the practical application of these devices. New techniques of magnetic control were developed to take advantage of the surprisingly low diurnal varation encountered in the area. It was demonstrated that the quality of magnetic information derived from an aerial survey of deep basement structures is superior to that of the best ground surveys, and that Shoran provides an exact and practical system for establishing low-order geodetic position as well as accurate local flight guidance. An analysis of production and cost factors in aerial surveying indicates that air-borne-magnetometer surveys have certain optimum operational levels of intensity, depending on such factors as base facilities, area involved, and weather.

Derivation of Magnetic and Gravitational Quantities by Surface Integration

D. C. SKEELS, Standard Oil Co. (N.J.), and R. J. WATSON, Standard Oil Co. (Bahamas), Ltd.

IN an earlier paper by one of the authors it was pointed out that if the vertical component of a gravitational or magnetic field is known over a horizontal plane surface of sufficient extent, all other components and derivatives of the field can theoretically be calculated by surface integration of the vertical component. In this paper examples are given to show that within certain limits such calculations are not only theoretically possible but practically so. Examples are given of the calculation of curvatures from observed gradients, and of horizontal magnetic intensity from observed vertical intensity, and the calculated values are compared

with those obtained by observation. Examples are also given, based on artificial data, of the calculation of plumb-line deflections from gravity, and of the calculation of magnetic anomalies at a given elevation above the earth from data obtained at the surface. The purpose of these calculations is to demonstrate the nonindependence of the various derivatives of gravitational and magnetic potential.

The Bahamas Airborne-Magnetometer Survey

JOHN BEMROSE, Shell Oil Co., Inc.; J. C. HEGGBLOM, Gulf Research & Development Co.; T. C. HOLT, Superior Oil Co.; T. C. RICHARDS, Anglo-Iranian Oil Co., and R. J. WATSON, Standard Oil Co. (N.J.)

THIS paper presents some of the background prior to the actual survey, the functioning of the participants' "technical committee" and its relationship to the contractors. A brief outline is also presented covering the various technical phases of the operation together with some of the inherent hazards of the area, how they were handled, and concluding with a summary of recommended changes in equipment and procedure for any further project of the same type.

Radio Survey and Navigation Systems

J. E. HAWKINS, Seismograph Corp., Tulsa.

A GENERAL description is given of the various radio position locating systems. The differences are pointed out between pulse-type systems and continuous-wave systems. The essential features are described of a system which has been developed to meet the requirements of the oil-exploration industry.

Some Problems of Magnetometer Surveys

ROLAND F. BEERS, Geotechnical Service Corp., Dallas.

THE development of the continuously recording mobile magnetometer presents new factors in geophysical operations. The characteristics of these new instruments are described, together with features which adapt themselves to new exploration planning. It is observed that new areas of application have been uncovered by virtue of the economies of mobile operations. Comparisons are made between airborne and surface operations.

Analysis of Total Magnetic Intensity Anomalies Produced By Point and Line Sources*

ROLAND G. HENDERSON and ISIDOR ZIETZ, Geophysicists, U.S. Geological Survey.

THE component of total magnetic intensity in the direction of the earth's total field, the quantity measured by the airborne magnetometer, is studied in relation to point-pole and line-of-pole sources. Theoretical profiles are examined for maxima and minima, and it is established that the depth is a linear function of the half-maximum abscissa. A family of curves is presented by means of which factors can be obtained for use in estimating depths. The well-known factors used with vertical intensity profiles are included as a special case. An example is given in which the factors are used in analyzing a theoretical anomaly.

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On-the-Job Training in Exploration Geophysics

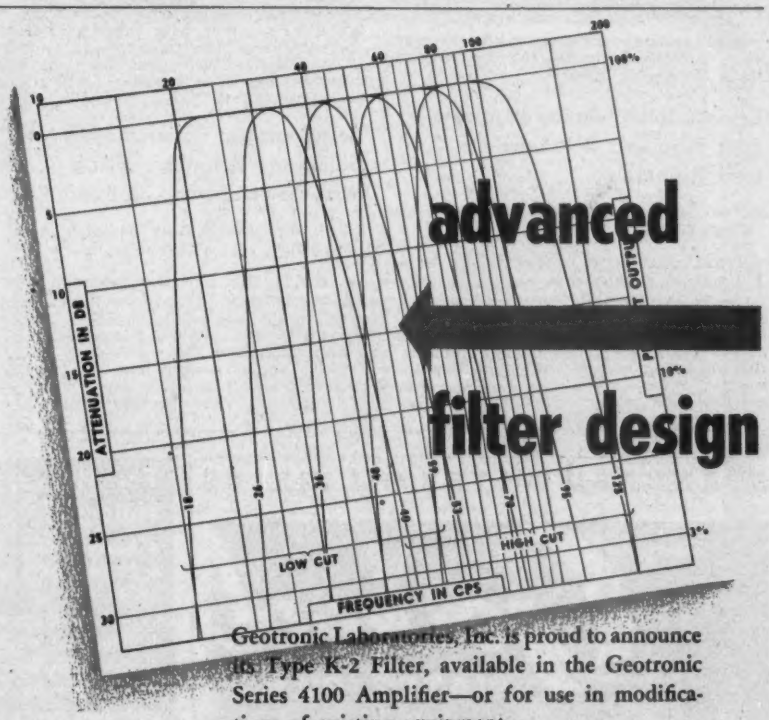
W. E. PUGH, Seismograph Service Corp., Tulsa.

THE lack of men trained specifically for exploration geophysics resulted in the institution of an "on the job" training program for overcoming, at least in part, the roots of the difficulty. The subject is treated principally from the point of view of seismograph work. The development of the program from conception to inauguration is discussed briefly, along with the presentation of selected excerpts from the training material, and diagrams to illustrate its proposed (theoretical) execution. The actual operation of the training program and the difficulties encountered are analyzed, objectively and in retrospect. The paper is terminated with a brief resume of the results obtained, and conclusions.

Some Aspects of the Quantitative Interpretation of Magnetic Anomalies Over Vertical and Inclined Veins—Part 1*

KENNETH L. COOK, Section of Geophysics, U. S. Geological Survey.

BY using ordinary induction methods of analysis, Haalck, Heiland, and others have developed formulas which express the magnetic anomalies over vertical and inclined veins of tabular shape as functions of the susceptibility, dimensions, and disposition of the vein and of the strength and direction of the earth's field. On the basis of these fundamental formulas, other formulas for the vertical component of



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the magnetic field are derived for such veins in intermediate northern magnetic latitudes. Special emphasis is given to the orientation of the veins relative to the magnetic north direction. Several families of magnetic response curves for veins with different strikes and dips, which have been computed in part by a graphic method, are given.

All theoretical curves for veins striking magnetic north are plotted in terms of a parametric unit so that, once plotted, they can be used universally in any district, provided a proper multiplying factor is chosen for the observed curve. A graphic method of choosing the proper multiplying factor is shown. The importance of the transverse horizontal magnetization effect under certain conditions of orientation is demonstrated. It is shown mathematically that small anomalies are to be expected for veins striking east and dipping south at an angle that is equal to, or approximately equal to, the complement of the angle of magnetic inclination.

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Seismic Interpretation Problems And Proposed Solutions by Joint Research

H. M. THRALLS, Seismograph Service Corp., Tulsa.

INTERPRETATION problems are occasionally encountered which defy solution by accepted interpretation procedures. Examples of such problems are shown.

The opinion is advanced that the industry as a whole is lacking the detailed information regarding average velocities from the surface, interval velocities between key horizons, and proven correlations between seismic events and formation tops; that the possession of such detailed information in one or more specific areas is a starting point for interpretational research which should be valuable to the industry as a whole.

Other general problems to which solutions could be approached by joint research are mentioned.

A procedure for joint research is outlined and the existing organizations which might sponser the research are named.

Studies in Fault Detection With The Reflection Seismograph

MARTIN C. KELSEY, Rayflex Exploration Co., Dallas.

FAULTING has long been recognized as an important factor in the formation of traps for the accumulation of oil and gas. A discussion is presented of some of the problems connected with fault interpretation, together with suggestions as to methods which may be employed to assist in the solution. Field data and final fault interpretation of a peculiar problem are herein illustrated.

Seismograph Determination of Salt-Dome Boundary Using Well Detector Deep on Dome Flank

L. W. GARDNER, Gulf Research & Development Co., Pittsburgh.

A METHOD is given for determining the boundary of a salt dome, based upon first arrival time measurements of seismic waves from ordinary shot points distributed around the dome and received by a well detector within a deep hole flanking the dome and penetrating it at depth. This case is important, first because flank deep holes become available as a byproduct of drilling programs, and second because a flank location permits the acquisition of good information on the velocity distribution in the sedimentary section surrounding the dome, which information is essential to the success of the method. The three-dimensional problem of locating the dome boundary, taking account of radial and vertical changes of velocity within the surrounding sedimentary section, is solved by the determination of vertical and horizontal cross-sections of "aplanatic surfaces" as set forth.

Field Techniques in Marine Seismic Exploration

R. L. Palmer, vice president, McCollum Exploration Co., Houston.

THIS paper presents a brief history of marine seismic exploration accomplished in submerged areas prior to 1944. For the most part this exploration covered inland or protected waters, and only in a few instances were offshore explorations undertaken. The increase in the demand for oil and the diminishing returns from land exploration gave the impetus required to start marine research and exploration in the Gulf of Mexico and other large areas of submerged land.

This paper also gives a brief history of refraction method as a means of reconnaissance exploration, with its merits and limitations. There are several illustrations showing line layouts and buoys adaptable to this type of exploration.

The paper then follows with a detailed discussion, accompanied by numerous illustrations, giving the history of reflection marine techniques and equipment developed since 1944. This discussion deals primarily with five phases of field operation, namely, surveying, sizes and types of boats most suitable for work, placing of shots

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in water, line layouts for reconnaissance and detailed surveys, and methods of placing geophones in water.

The paper ends with an illustration showing the approximate acreage already leased in the Gulf of Mexico from Brownsville, Tex., to Mobile, Ala.

Problems in Marine Seismic Exploration

THOMAS L. ALLEN, Seismic supervisor, Petty Geophysical Engineering Co., San Antonio.

SEISMIC exploration conducted in coastal waters of the Gulf of Mexico off the states of Mississippi, Louisiana, and Texas has met several problems not ordinarily encountered in comparable work on land. The matter of public relations is probably the most unusual. Protests of commercial fishermen and, to a limited extent, of sports fishermen have had to be considered.

The problem of surveying, particularly when the work is several miles offshore, has been partially solved by the adaptation of electronic instruments used during the war for aerial navigation or air-raid warning devices.

Conversion of seismic instruments, which were developed for use on land or shallow inland waters, into satisfactory marine equipment is also a problem that has not been completely solved.

Sea Bottom Slope Determination From Water Sound Arrivals

W. B. AGOCS, Department of Physics, Lehigh University, Bethlehem, Pa.

PREVIOUSLY* it was shown how the time break could be determined on deep-sea seismic records from the water sound arrivals. An extension of the previous problem has been made, for the more general case of a sloping sea bottom. By successive approximations, it is found that from the ratio of the difference of direct water-wave arrival and the first reflection from the surface of the sea, and the difference in time of the second and first reflection times, and the ratio of difference in time of arrival of the second and first reflections to the difference in time of arrival of the third and second reflections from the surface of the sea, the depth of shot below the surface of the sea, shot-detector distance, and the direction and magnitude of the sea bottom slope may be determined. The converse of the method could be used to determine sea-bottom slopes in hydrographic surveys.

*Geophysics, Vol. 9, No. 2, April 1944.

Acoustic Well Sounding

ALEXANDER WOLF, Consultant, Houston.

THE principle of the acoustic determination of fluid level in a producing well can be traced back to an idea patented 50 years ago. The paper outlines the development of the method, the instruments now available, and the purpose of acoustic well sounding.

Acoustic Impedance Well Logging

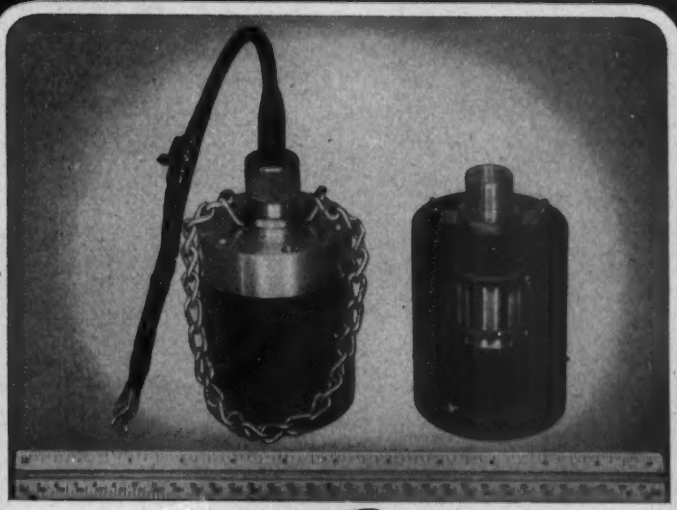
C. H. KEAN and F. N. TULLOS, Humble Oil & Refining Co., Houston.

SEVERAL years ago, the senior author conceived the idea of placing a cylindrical sound source in a bore hole and obtaining an acoustic impedance log. There were mathematical reasons to believe that a "free free" tube driven in its longitudinal mode would be suitable. Such a device was constructed from magnetostrictive material (nickel) and built in a way that made the system self-driven. An "automatic volume control" indicated the amplitude of the tube when a fixed driving current is applied. Highly reproducible logs were obtained on a large number of core holes, and very good correlation was obtained from hole to hole. Slides are given indicating the construction, the operation, and the results.

The Use of Electric Logging Equipment in Seismograph Exploration

W. J. OSTERHOUDT, Gulf Research & Development Co., Houston.

IN a Texas Panhandle area located north of Pampa, in Gray and Roberts counties, seismograph experiments disclosed a slow velocity weathered zone, or zones, about 350 ft. thick. Records from shots placed above the V_1, V_2 boundary were generally worthless. The quality of the reflection records approached an optimum if shots were detonated at critical positions below the V_1, V_2 boundary, but multiple shooting ruined the holes. A small Guyod electric logger was employed to map the V_1, V_2 boundary and to predict the more favorable shooting depths. The resistivity curves on the electric logs showed a strong discontinuity at the base of the V_1 zone which correlated with seismograph measurements and calculated data from up-hole times and plots of V_2 arrivals versus shot detector distances. The electric logs were used to determine the depths to set casing, to guide the seismograph operator in the selection of favorable shot hole depths, and finally by



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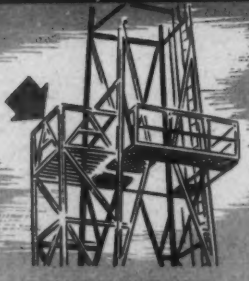

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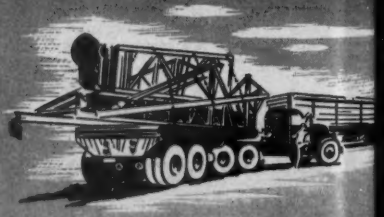

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Today's widespread field operations frequently require portable drilling equipment. In foreign fields, however, the use of portable masts has been restricted by high costs involved in water transport of the large, cumbersome mast sections. The new Emsco PE series of export portable masts solve this problem. These new masts are assembled from small welded sections which are bolted together. These small sections are designed to provide a substantial reduction in shipping bulk. A complete 94', 12 PE mast boxed for export measures only 5'6" x 5'4" x 40'8"—one-fifth that of a standard domestic mast. These compact, easily handled units reduce shipping costs 80%! The sturdy, compact box permits loading in hold of ship. Thus, the entire mast is protected against rough handling and the weather during water transport. Also, the lumber used for boxing frequently can be profitably reused for field erection of tool sheds, etc. Small welded sections permit hot dip galvanizing of entire mast. This means permanent protection against corrosion and greatly reduced maintenance costs. After export mast is originally assembled in the field, it is moved and operated like a domestic unit. These new export portable masts incorporate all field-proven features of Emsco standard bulge type masts. They are available in 94, 129 and 136 foot heights with crown block capacity ratings in excess of 400,000 lbs. Ask your nearest Emsco representative for information on the PE series of bulge type portable masts—the newest addition to the Emsco line.

See the new Emsco export portable mast on display at the International Petroleum Exposition, Tulsa, Oklahoma, May 15 to 22, 1948

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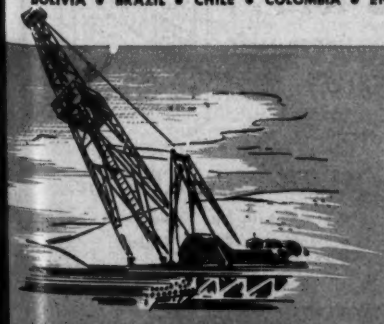

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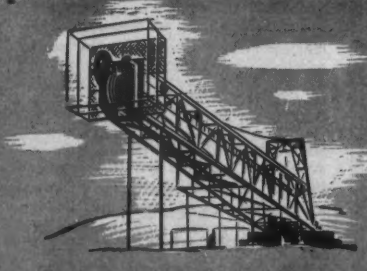

STRUCTURAL RIGIDITY
Lacing of all four faces of mast eliminates need for interior bracing. Welded joints and small cross section practically eliminate vibration and weaving.

the geophysicists to check weathered zone corrections. The use of a portable electric-logging equipment is recommended as an aid to seismic exploration in certain areas.

A Seismic Survey of the Canadian Shield

JOHN H. HODGSON, University of Toronto.

A SERIES of large rockbursts, occurring at Lake Shore Mines, Kirkland Lake, Ontario, offers a source of energy for the investigation of the crustal structure underlying the Canadian Shield. In order to obtain a refraction profile two field stations, each equipped with three-component Sprengnether seismographs, will be operated at a succession of points along a line between Kirkland Lake and Ottawa. Each point will be occupied until a burst has been recorded.

The paper outlines the peculiar advantages of rockbursts as a source of energy, and describes the instrumental and mechanical details of the project, which was instituted on July 1, 1947.

Explosives Accidents on Geophysical Crews

P. M. HANAHAN, Health and Safety Division, U. S. Bureau of Mines, Dallas.

THE need of a standard set of safety rules is emphasized. There are indications that seismic personnel have become somewhat careless since the removal of some of the wartime regulations. The Texas City disaster has called attention to hazards of handling explosives on docks and boats, and to smoking regulations.

Dangers associated with the use of liquefied petroleum gases on boats and methods of avoiding them are pointed out. Studies of premature ignition from electric current generated by aluminum loading lines, and by static electricity are reviewed.

Seismic Exploration In Mississippi

J. WILLIS HUGHES, Jackson, Miss.

THE paper presents a concise history of seismic work in Mississippi, discusses the problems encountered, reviews the results obtained and submits the writer's recommendations for more effective exploration.

Relevant Significant Figures In Seismic Interpretation

H. J. McCREADY, Seismograph Service Corp., Tulsa.

THE principle of relevant significant figures is introduced and its role in seismic interpretation is discussed. The importance of the principle is stressed by examples. It is indicated that recourse should be made to this principle if fallacious inferences concerning velocity, depth, and dip data are to be avoided.

Computational Aids for Solving Refractions

E. J. STULKEN, Geophysical Service, Inc., Dallas.

A DISCUSSION of four cases is given: (1) Multiple-layered section of constant velocities. (2) Velocity of the type

$$v = v_o + Az.$$

(3) Velocity of the type

$$v = v_o \sqrt{1 + Az}.$$

(4) Velocity of the general type

$$v = v_o (1 + Az)^{1/2}.$$

For each case mention is made of (a) a means of identifying the velocity function and (b) depth computation methods. The construction and use of new computational charts is described.

DIGESTS OF S.E.P.M. PAPERS

Principles of Regional Sedimentary Stratigraphic Analysis

W. C. KRUMBEIN, Northwestern University, Evanston, Ill.

LITHOFACIES maps may be prepared in a number of ways, and the present paper emphasizes a statistical approach which brings out rates of change, to indicate whether facies transitions are rapid or slow. The method consists in using a "clastic ratio" based upon the ratio of sand plus shale to limestone plus evaporites. This is supplemented by a "sand ratio," which is the ratio of sand to shale in the section, regardless of the nonclastics. The data obtained are numerical and provide a basis for contour-type maps of statistical lithologies. For the more detailed analysis of lithofacies, a series of ratios based on sandstone and limestone types is available, which helps distinguish platform, basin,

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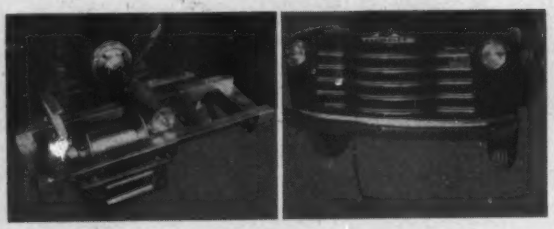

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and geosynclinal deposits. The use of general or specific lithofacies ratios in conjunction with isopach maps affords data for interpretations of contemporary tectonics, paleogeography, and to some degree the distribution of environments during the depositional cycle.

The Foraminifera Orbulina Universa D'Orbigny as a Possible Middle Tertiary Time Indicator

L. W. LE ROY, Colorado School of Mines, Golden.

IT is suggested that points of lowest biostratigraphic occurrence of the pelagic foraminifer Orbulina universa d'Orbigny occurring in a continuously deposited, open-sea, deep-water globigerine-facies sequence, fall on or in close proximity to a time horizon within Middle Tertiary sections now situated in tropical and subtropical zones of the world. It is recommended that these points constitute a datum to be termed the "Orbulina surface." The definition of this surface would assist materially in establishing world-wide Tertiary time-stratigraphic correlations. The distribution and significance of Orbulina and its allied form, Candorbulina, in the Kassikan section of Central Sumatra are discussed. This section is believed to contain a qualified point for the "Orbulina surface" and is recommended as the type for the western portion of the East Indian Archipelago.

The Stratigraphic Significance of Endothyroid Foraminifera

EDWARD J. ZELLER, University of Kansas, Lawrence.

THE use of Endothyra as an index fossil of Meramecian deposits, especially of the Salem limestone, is not new. However, extensive studies of Mississippian limestones from lower Kinderhookian to Chesterian have revealed the presence of this group of Foraminifera throughout the section. Examination of some of these limestones from which Endothyra had not been previously reported has yielded them in great abundance. They first appear in upper Devonian strata, become fairly abundant in Kinderhookian and Osagian deposits, and attain maximum development, both in size and abundance, in Meramecian limestones, then decline somewhat in the Chesterian. Endothyra, as previously recognized, is found to contain forms that should be excluded from the genus.

Lithologic Variations of the Viola Limestone of the Arbuckle Geosyncline

S. A. WENGERD, University of New Mexico, Albuquerque.

THE Mid-Ordovician Viola limestone of South-Central Oklahoma comprises those strata lying between the Fernvale limestone and the Simpson group. Viola strata deposited on the platform, the platform slope, and in the basin of the Arbuckle geosyncline are predominately limestone, dolomite, and chert with quantitatively minor clay, sand, and silica other than chert.

The Viola formation is lithologically divisible into four principal members correlative over a wide area. Those unnamed members, numbered from 1 at the top to 4 at the bottom, are locally divisible into lentils whose thickness and extent are clearly related to the sources of supply, the submarine topography, and the downwarping of the depositional basin during Viola time. Members 1 and 3 are each divisible into two submembers of regional extent. The four principal members and most of the lentils, with few exceptions, thicken from the platform on the northeast to the basin on the southwest. Though the total silica content increases basinward, chert is concentrated mainly in members 1 and 3 on the platform slope. Dolomite is found in abundance only on the platform, whereas clays make up a higher percentage of the section on the platform slope and in the basin. Light hues and coarse textures of the platform and platform slope beds grade into darker hues and fine textures in the basin equivalents.

Subdivision of the Viola limestone is based primarily upon (1) the percentage and types of insoluble residue, (2) the percentage and type of chert, and (3) the texture and color of the limestone and dolomite. Less useful criteria for subdivision are the clays, glauconite, pyrite, and silica other than chert. The formation is less readily divisible into members in the basin than on the platform.

Associations of Lithologic and Tectonic Environments in The Central States

E. C. DAPPLES, W. C. KRUMBEIN, and L. L. SLOSS, Northwestern University, Evanston, Ill.

LITHOLOGIC responses to tectonic controls permit the organization of sediments into several broad groups, depending upon their accumulation on platforms, in basins, or in geosynclines. Each lithologic association includes particular sandstones, shales, and limestones, which in the aggregate are the result of the tectonic framework, the tectonic intensity, and the nature of the depositional environment. This paper attempts to integrate these three points of view, each of which bears on the problem of interpreting the ancient rock column.

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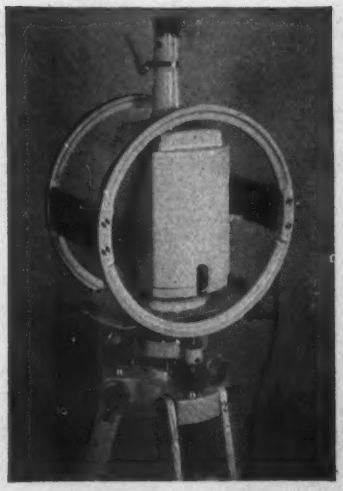
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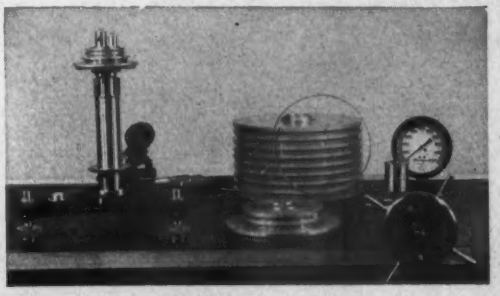
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Over-all sketch showing, upper right, odograph preliminary spotting, and, center and left, precise surveying by tower-mounted stadia rod and transit

SURVEYING—

In Brush-Covered Country

by K. H. Waters*

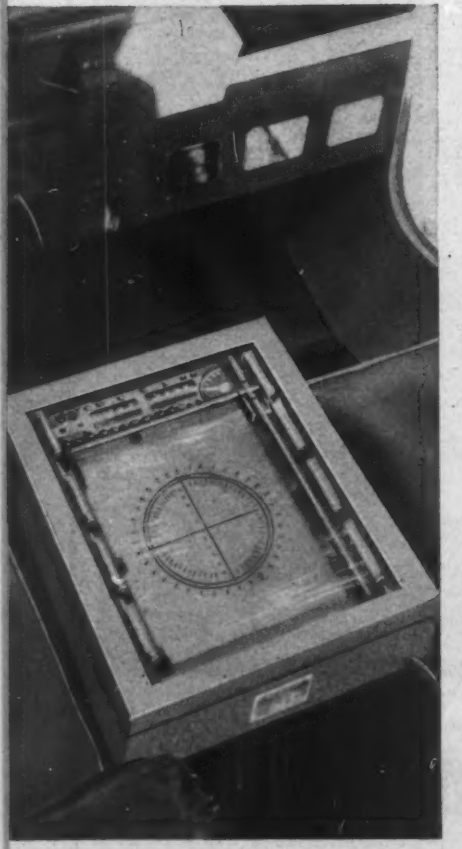


Fig. 1—Plotting table and integrating mechanism of the odograph

THE mesquite-covered country which is encountered in West Texas, particularly on the Edwards plateau, has, up to the present, called for considerable expenditure solely for topographic surveying. When refraction seismic work is being done, it is necessary, in order to preserve the accuracy of the seismic results, to be able to survey the locations of shot points and recording points both rapidly and accurately.

It is a convenient and an economically sound procedure to split this requirement into two parts and to deal with them separately. In the first phase, the shot-point locations and

*National Geophysical Co., Inc., Dallas.

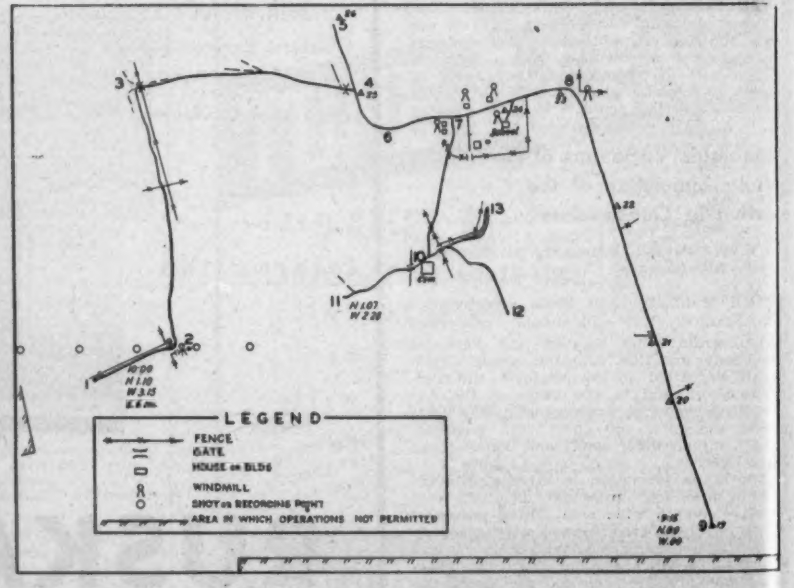


Fig. 2—Typical odograph map. The irregular line which connects the large figures was drawn by the odograph. Extra fence lines, culture, etc., were put in by the operator. The figures shown (e.g. N 1.07, W 2.28) are coordinate counter readings at these points

other required points are placed within an accuracy of approximately 100 ft., after which, during the second phase, the positions of all points are tied together precisely by a method which eliminates the cost of extra labor and time spent in brush cutting.

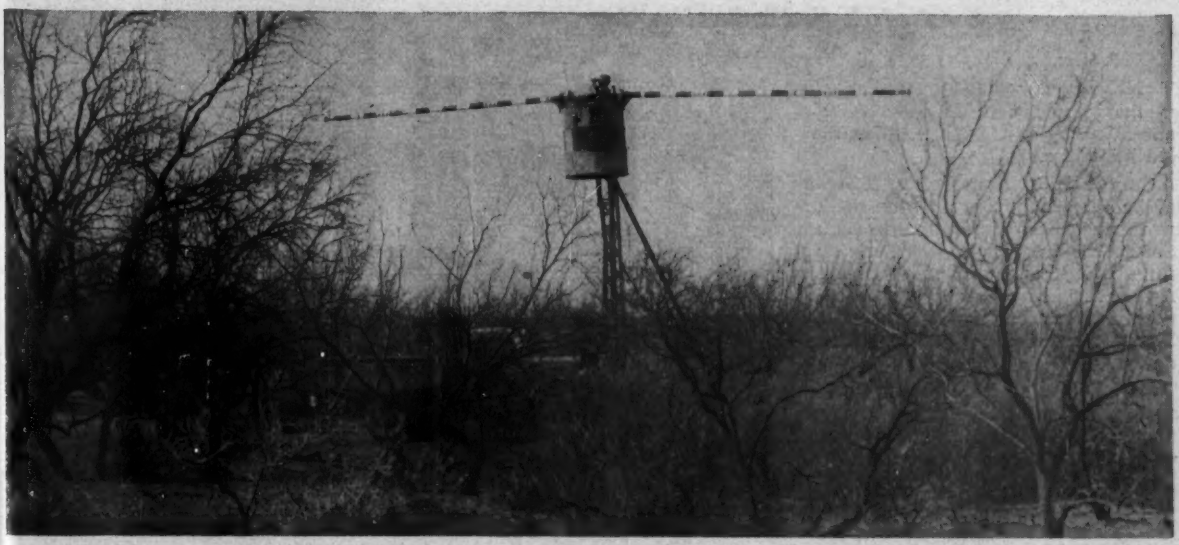
Phase 1.—The rapid placement of shot-point locations and the further problem of mapping trails, fences, gates, and local culture is solved by use of the odograph.† This instrument,

(Continued on page 143)

†The Vehicular Odograph, A. G. McNish and Bryant Tuckerman, "Terrestrial Magnetism and Atmospheric Electricity," Vol. 52, pp. 59-66, March 1947.

Fig. 3—Two towers in traveling position

Fig. 4—(Above, left) Surveyor taking a shot from the top of a "mesa." Fig. 5—(Below) Stadia tower in brushy country. Surveyor takes a "field angle" reading. Fig. 6—(Above, right) Surveyor making stadia reading in brushy country



The draw-works engine and traveling block are used to raise the 88-ft. steel mast on Service Drilling Co.'s new portable rig. Steel cables passing over pulleys at the top of the two-post framework, which can be seen in the picture, do the work

Many Heavy-Rig Features In New Portable Rig for Shallow-Well Drilling

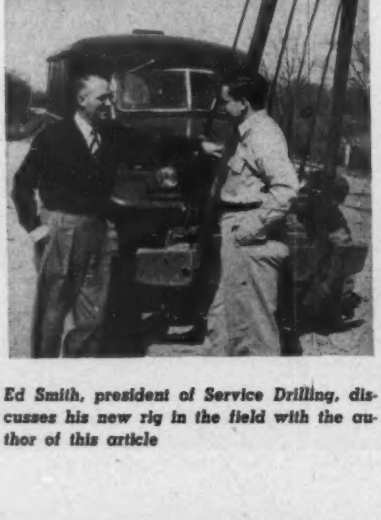
by Leigh S. McCaslin, Jr.

I NEVER expected to find a rig that would drill as easy as this one . . . why it runs easier than that old Ford of mine."

Corny? Sure! Nonetheless, it is an authentic quote from a Cajun driller working on the unusual new rig of Service Drilling Co., Tulsa. Many features normally found only on large rigs have been incorporated into this portable, mast outfit designed for the highly competitive field of shallow drilling.

Layout and design of the rig were supervised by Ed Smith, president of Service Drilling, who had many ideas of his own concerning the "ideal" rig layout as the result of 30 years' experience in Mid-Continent fields. Smith's objective was to obtain a safe, efficient drilling rig that was highly portable and economical to operate. In reaching these objectives with his new rig, Smith has taken advantage of many of the latest developments on the market. Smith's son, Sherman, who is a senior student in mechanical engineering at Oklahoma A. & M. College, did the actual layout work during the design phases. He has also had several years of field experience in production and drilling.

Of particular interest are the controls centered at the driller's position. The seven controls include: shifting and speed lever for draw works, shifting and speed level for mud pump, automatic cathead, spinning cathead, draw-works brake, and 2-ft. pedals for rotary clutch. The single lever to control both the speed and shifting of the draw works is made possible by the use of a torque converter between the draw works and its prime mover. In addition to the friction brake, the draw works is equipped with a hydromatic brake. During trips back into the hole, an air control automatically disengages the hydromatic brake when the blocks are raised and reengages automatically when the blocks start down. In addition, a manual lockout can be used to disengage it when its use is not required. Air clutches are used



Ed Smith, president of Service Drilling, discusses his new rig in the field with the author of this article

With the mast fully raised, the two-post frame forms a canopy over the driller's position, draw works, and engine

Above, left: A crew member gets a wrench out of the unique tool box which reduces rig-up and tear-down time. Above, right: Ted Wade, drilling superintendent for Service, takes over the driller's position while a connection is made. Right: The "Service Drilling Record" which is maintained on all wells drilled by the concern

for the high-speed and low-speed drum drives of the draw works while a two-plate, 14-in. mechanical clutch is used for the rotary drive.

Another interesting feature is the method of raising the 88-ft. steel mast. As can be seen in the accompanying photograph, the rig's own drilling blocks are used for this job. A steel cable is passed over pulleys located at the top of a two-post framework constructed perpendicular to the mast. From the pulleys the cable is passed under the draw works and rides on a 72-in. steel roller on up through the floor where it is passed through the hook of the blocks. The draw works is then used to raise the blocks, thus raising the mast. This mechanism is so designed that the draw works engine can raise the mast while idling. After the mast has reached the perpendicular the two-post frame forms a canopy over the driller's position, draw works and engine. Canvas is placed over it to provide protection from the weather. Smith has applied for a patent covering the design features of the mast. Stress analysis work involved in designing the mast was done by David R. Graham, consulting engineer of Tulsa.

Unusual Substructure

A third major feature is the compact, utilitarian substructure. In order to obtain the utmost in portability, the substructure has been designed to contain within itself many

(Continued on page 145)

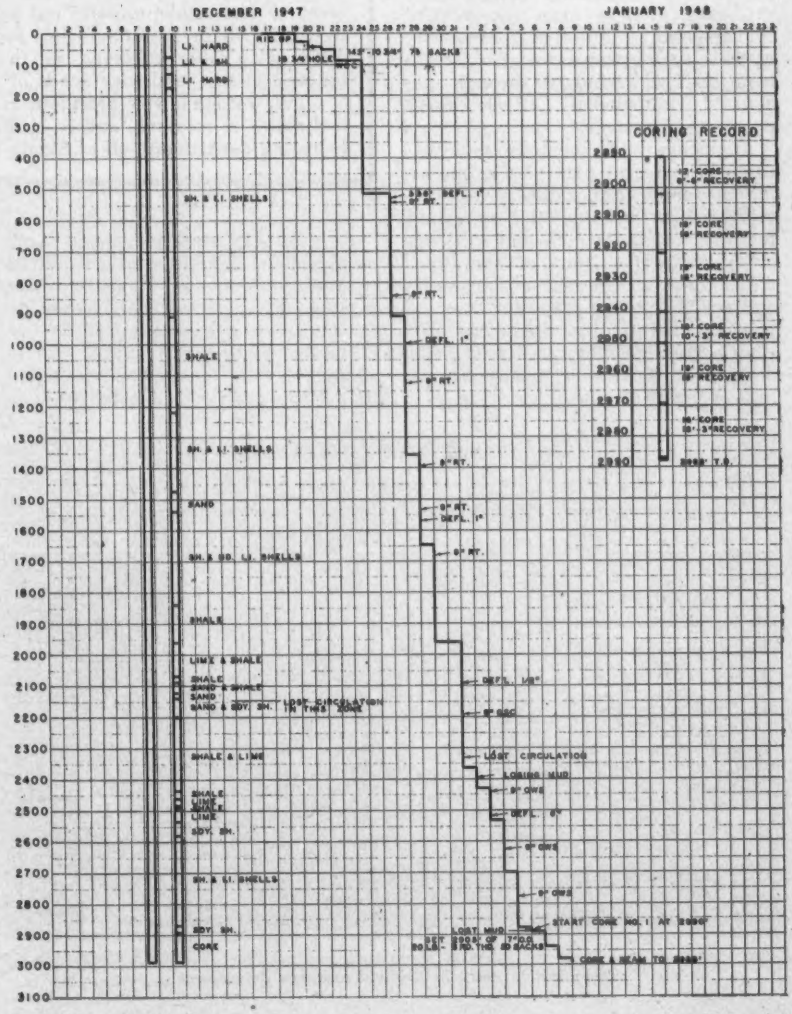
SERVICE DRILLING RECORD

KEWANEE OIL COMPANY

SALE LEASE, WELL NO. 14

NE OF SECTION 28 - 27 N - 6E

OSAGE COUNTY, OKLAHOMA



Skelly Fortifies Against Future REFINING PROBLEMS

Research laboratories of Skelly Oil Co. at Pawhuska, Okla.

by J. W. Vaiden, F. E. Fisher and H. H. Below

THAT research can be of the utmost commercial value to an industrial undertaking is now generally accepted. Skelly Oil Co., like many others in the petroleum industry, found and accepted this fact. The research laboratories at Pawhuska, Okla., equipped and staffed for long-range studies of interest to the company's future manufacturing activities, offers concrete evidence of the value attached to organized industrial research.

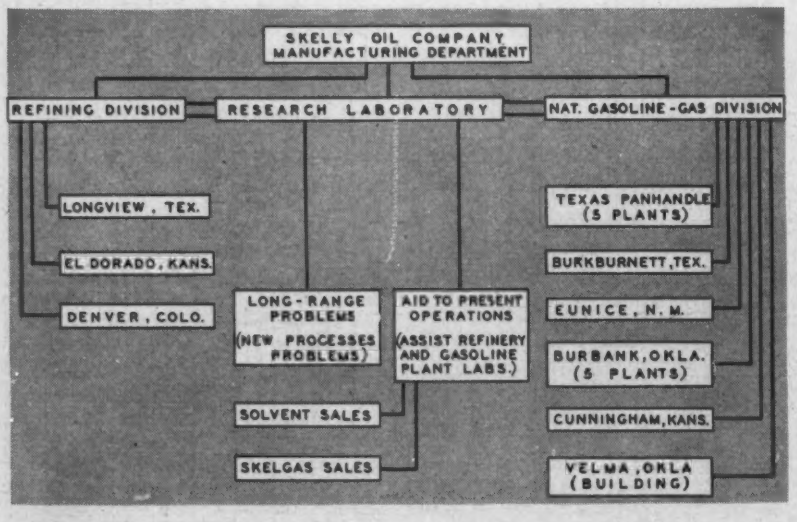
It is not the purpose of this paper to reiterate the advantages of research but rather to point out how this modern tool has been applied by Skelly in its manufacturing department. The pattern probably will differ with other concerns, as, in general, research programs must be tailored to the particular needs of a company's business.

J. W. Vaiden is vice president in charge of manufacturing. F. E. Fisher is director of research, and H. H. Below is special assistant in the manufacturing department, all of Skelly Oil Co., Tulsa.

THE refining of crude oil and the manufacture of natural gasoline, liquefied petroleum gases, and kindred products have, over the years, brought to Skelly's manufacturing department a myriad of technological problems. It was long ago evident that the ready solution of the majority of these problems necessitated a technical staff which might, through specialized knowledge, attack these problems effectively.

Engineers and chemists thus became an integral part of the operating personnel. Laboratories were established to provide the necessary facilities for these men and soon became the active heart of operations with constant studies of processes and products being made for the purpose of maintaining operating efficiency and product quality and for developing ways and means for the improvement of both.

It is but natural that under such environment thought would be given to the problems of tomorrow. The rapidly increasing pace of technology in the refining business left no uncertainty that many things would change. It was management's belief that if the company expected to keep pace with progress and maintain its economic position, it would be necessary to be prepared to meet any changes if and when they occurred, whether concerning product specifications or process technology.



Organization chart of Skelly's research department

Long-Range Research

In appraising the problems before our industry and, in particular, their possible effect upon our company's operations, it became evident that to be effective, long-range problems should be separated for study from the constant process and product studies and trouble shooting that occupied the greater part of the time of the technical organization in both refining and natural-gasoline departments. In accordance with these findings, Skelly's research department was established, whose chief function was to concentrate upon long-range research problems and development, unhampered by the daily problems of production.

In a broad sense, the main pursuit of a petroleum research department is the search for new possibilities in the way of process or product, or an improvement in previously established methods and products, and the reduction of these findings to prac-

tice. At first sight this appears to be a rather easy assignment because of the seemingly endless possibilities offered in hydrocarbon chemistry. As a practical matter, however, to be effective and to keep within reasonable bounds imposed by good management, the work must be properly organized and directed within a relatively narrow confine.

The full potentialities of any research findings are usually realized only after years of work. The work entails many risks and generally a number of failures, sometimes costly ones. Industry is interested in profits. It expects to get tangible results from research. The mere fact that the work must be projected years ahead makes the choice of projects a most difficult one.

Our research is concerned primarily with problems of manufacturing, and the completion of a research project must be capitalized by the subsequent construction of a producing unit before the laboratory findings become a commercial and profitable reality. It is imperative from this viewpoint, therefore, that a most cooperative relationship be maintained between research and manufacturing. Research must be conscious not only of the existing problems of manufacturing but must be capable of anticipating its future problems and furnishing at least a portion of the answers to these problems when they materialize. Manufacturing, on the other hand, should be conscious of what research is attempting to do in its behalf and be informed on the progress of research developments so that reduction to commercial practice of laboratory developments may be accomplished smoothly and effectively.

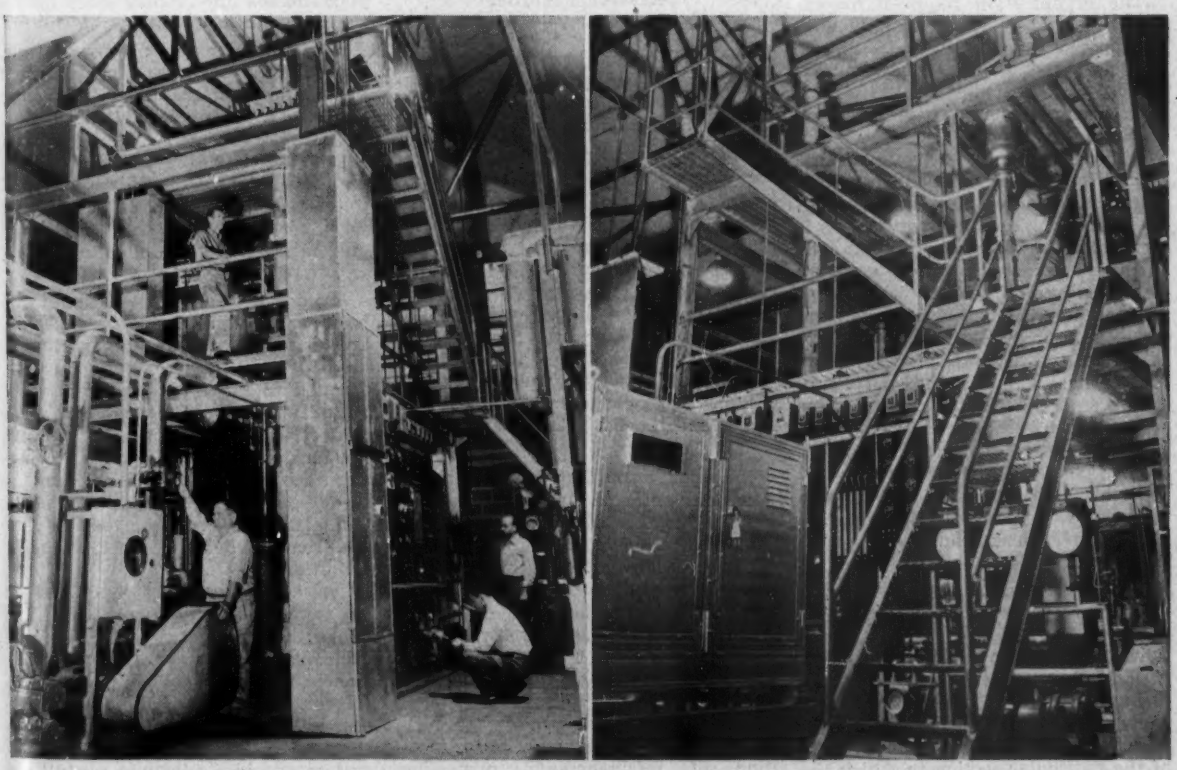
Coordination of Research and Manufacturing

The introduction of a new process into manufacturing always requires a readjustment of operating practice and, in general, usually does not receive a very hearty welcome by either operating management or personnel. For this reason our research personnel are prepared to carry new developments through the pilot-plant stage within their own organization and to furnish the design data necessary, supplemented by the technical assistance that may be required during engineering design and construction of commercial plant.

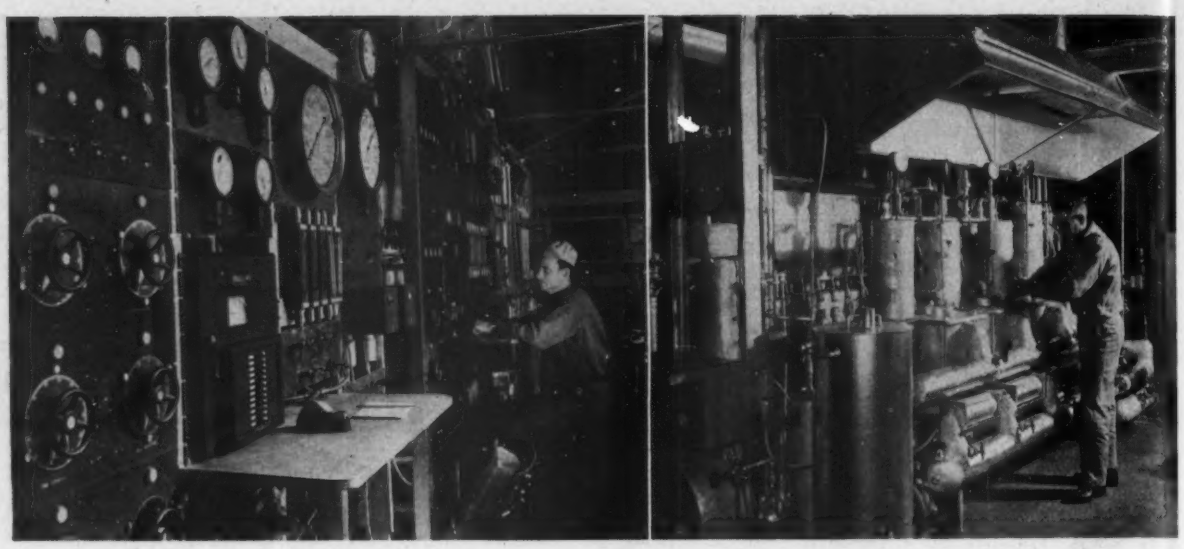
Research also bears a part of the responsibility for initial operations of such new plant construction, making available to manufacturing the specialized resources of research in solving such preproduction problems as are usually encountered in any new process. This policy has resulted in a most desirable spirit of cooperation between the research and manufacturing departments which renders research work much more effective.

The mechanism largely responsible for this relationship is in the form of a research coordinating committee of 10 men, comprising the research director, and representatives of refining and natural-gasoline and gas divisions of the manufacturing department. This committee meets quarterly at the research laboratories, where research progress is reviewed and a mutual understanding obtained of the changing aspects of both research and manufacture. Problems arising in the production units, concerning improvements in qualities of products, in efficiencies of conversion or consumer application, are discussed even though such problems fall within the group handled by the refinery and gasoline-plant laboratories. Should any of these problems be of such magnitude or importance as to justify recourse to the greater facilities of research, they are discussed in some detail by the committee before a formal request is made for assistance. Those problems that do reach research are usually not too involved and it is usually possible to absorb such work without interruption of major research projects. If this should not appear to be possible, if considerable additional personnel and/or equipment seems necessary, further consideration of the proposed work is delayed pending proper authorization of the additional cost of the project.

The committee reports to manage-



Left: One of the larger pilot-plant units in current operation. Right: The development laboratory provides for pilot-plant operations of several processes now being studied



Control panel and reactors on continuously operated semipilot-plant catalytic conversion process

ment of the manufacturing department the result of its quarterly meeting, together with its recommendations concerning both work in progress and new projects considered. This report supplements the quarterly report of the research director and provides management with a rather wide-angle view of research problems and activities.

Research Personnel

The organization required for research should be commensurate with the problems confronting it. Simple problems are usually solved by an individual. The major projects, however, become more complex as the work progresses and before completion usually involve a group of considerable size. Experience has taught us that the teamwork principle adopted by many research organizations is desirable. The complex problems arising from any major project can best be solved by professional men—chemists, physicists, mathematicians, and engineers—and their associated corps of assistants, operators, mechanics, electricians, helpers, and clerks, all acting as a coordinated team. In this way, not only is the highly specialized experience of such a group obtained, but also more minds are brought to bear on the problem with subsequent generation of more and often better ideas than would otherwise be possible.

Our research department is divided into three major sections: chemistry, engineering and patents. Actually, however, there is much overlapping in the fields covered by these groups, assignments usually being made because of the particular qualifications of individuals rather than by reason of the particular section in which the individual is employed.

Research personnel is composed of men and women who may, or may not, have had considerable experience in the petroleum industry. In either case, however, they are experienced in the very special technique of research. Their methods are largely original rather than a duplication of those of other organizations in the same field, and the results may therefore offer something new and novel if not revolutionary.

Research Facilities

Research must be supplemented by a material capital investment in tools and service if it is to work effectively. Adequate equipment greatly lightens the burden on personnel and enormously reduces the time spent on the more complex problems.

One of the major tools of research is a well-equipped technical library. Not only must personnel be kept up to date by current progress in the technology of this and allied industries, but must have available for reference the literature record of all that has gone before which is pertinent to the work at hand. So far, our library has selected over 2,500 volumes and the list is constantly growing.

Another important feature of research is patents. One section of our research is devoted to this work. This section, in collaboration with the library, guides investigations to prevent duplication of work already done by others. The business of preparing a patent and prosecuting it through the U. S. Patent Office is a complicated one, and the relationship of patent attorney and research technologist must be very close for optimum results. The work of prosecution of infringements, protection against suits claiming infringement, arrangement of patent licenses, in addition to the work of preparing patents are duties of this section.

Operating expenses for an organization of this character are likewise no small item. Obsolescence of experimental equipment is sometimes high and the specialized nature of much of the equipment and materials makes them naturally costly. Maintenance alone requires a sizable service organization and expense. All of this added to the salaries of the research staff makes the annual cost of research a substantial item.

Research "dividends," as a whole, are difficult of actual measurement by ordinary standards. Yet research must be a paying institution if it is to justify its existence. Its costs must be projected over a period of years for completion of many projects; and unforeseen developments of any major project may increase budget requirements in considerable amount at any time.

Much has been written about the basis of providing funds for research, but it appears that the particular method used is one that must be adopted to the individual company's organization. Planning, coupled with control of projects, suitable accounting and cost control, and an evaluation of results seem desirable. In the case of our research, this is done on an annual basis with a quarterly review and readjustment to meet changing conditions.

Operating expense is budgeted on an annual basis. Expense over and above the annual budget, as may be required to meet unforeseen expansion in research development, is considered on a basis of the specific necessity, as is the case of major additions to capital investment. Such a system provides adequate control yet gives support for an active research program.

REFINERY-BURNER MAINTENANCE——

Definitions of maintenance include "Longest Possible Service Consistent With Safety"—"Maximum Efficiency and Longest Possible Life"—"More—With Less." This article is another in the Journal's Symposium on Maintenance of Refinery Equipment. A number of other articles of the symposium recently appeared in the Journal's Annual Refinery Number (April 1, 1948, commencing on page 184).

Burners should be maintained as close to "factory new" as possible, for best performance

***by Robert Reed** **

BURNERS and burner maintenance are the stepchildren of the modern refinery. It must be said that a concensus of burner manufacturers would favor the application of engineering skill of the highest order in the maintenance of such burners as are furnished for process and steam-generation equipment in refineries. No maintenance problem is beyond solution but certain highly specialized knowledge is required.

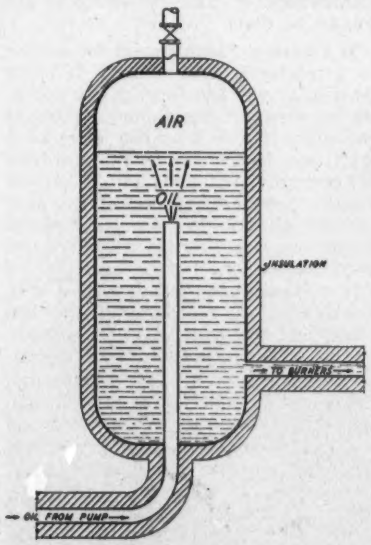
Oil, gas, and sludge provide the refinery fuels. Burners are provided for all three in various combinations, according to the utilities conditions in the refinery. Each fuel requires separate handling and maintenance.

Generally speaking a burner is a device which accepts fuel and air, mixes them properly, and delivers them for burning in a manner suited to the requirements of the service. The manufacturer of the burner has to the best of his ability recommended equipment which will be satisfactory; but, normal wear, erosion, and destruction of burner parts by heat make a certain amount of maintenance necessary.

Sludges, as fuels, are usually highly questionable; however, certain types have very good characteristics. A sludge burner must have large passages to avoid stoppage and must be made of materials which will resist both corrosion and heat.

The burning of sludge is as much a disposal problem as it is a problem of providing heat and since boilers are considerably more tolerant of bad flame condition the boiler house usually gets the sludge to burn. Among some of the alloys which have been used for sludge burners are aluminum bronze, Monel metal, K Monel, Hastelloy, and tungsten carbide. Sludge-burner parts made of any of the above may prove superior or may fail miserably. Each sludge is an individual problem which must be met and solved with the solution usually coming through trying everything that is available. Aluminum bronze does very well in resisting acid corrosion but very poorly in resisting heat. Monels seem to resist both fairly well but are not universally accepted. Tungsten carbide is very good for both heat and corrosion as well as erosion but is very expensive for a number of reasons. Because of the wide variations in characteristics of sludges, specific instructions as to maintenance of burners boil down to "cut and try" under supervision until a satisfactory arrangement of material and means for atomization is obtained.

Maintenance of oil burners usually involves first making proper choice of burners for the firing job to be done, then devising means for preventing plugging, coking, and excessive tip wear according to the type of burner selected.



This surge chamber design is desirable because the entire volume of the surge is directed against a resilient air pad. Pressure variations of as much as 50 psi. due to pump action are reduced to 1 psi. or less. The air pad should be periodically renewed

Refinery fuel oil is quite frequently a product which is unmarketable due to the presence of solid material or other conditions at variance with fuel specifications. Such oil requires special handling to prevent excessive maintenance.

Strainers Prevent Trouble

One of the very best things for bad fuel is proper straining to remove solid matter which will almost surely plug burners. It is true that the strainer will require cleaning at intervals but the manner of cleaning is very simple and a little time thus spent will save hours of work on burners as well as process difficulties which may be far more expensive. The strainers should be installed at a point in the system where the oil is very hot and they should be sized for at least four times the maximum volume of oil which is to be pumped. The perforations in the strainer screens should be slightly smaller than the minimum passage in the burners so that the solids are trapped in the strainer and not in the burners.

When new piping is installed in the oil system great care should be taken to see that it is clean. Small stones, sand, and dirt left in the pipe are sure to cause trouble.

Steady oil pressure is likely to eliminate external coking of tips because with steady oil pressure the burner

*Engineer, John Zink Co., Tulsa.

gets an optimum volume of oil which can be properly atomized, whereas badly pulsating oil pressure alternately floods and starves the burner to make it form nodules of coke on the tip.

Oil burners should be located very carefully according to the manufacturer's instructions because improper location may cause severe internal coking in the burners. All oil burners require a certain amount of cooling to prevent coking, and if sufficient cooling is not provided the burner is almost sure to coke. Unless the manufacturer has erred badly the design of the burner will provide sufficient cooling action.

Any time an oil burner is taken out of service it should be blown clear with steam and either removed from the furnace or retracted into the burner register to protect it from radiant heat. Failure to observe this precaution is the cause of most burner coking. If the burner has been taken out of service for only a short period and must be left in firing position in order to go back into service very quickly, the steam valve must be left open so that the flow of steam can act as a coolant in the tip.

The quality of the steam which is used for atomization should be good. Slugs of condensate which usually are the result of improper trapping are sources of both corrosion and erosion. The remedy is the installation of plenty of steam traps at points not too far removed from the burners. In passing it should be noted that much oil-firing difficulty may be traced directly to wet steam, so the reasons for installation of traps are both operational and maintenance.

Cold oil is undesirable from the standpoint of maintenance for many reasons. If oil is cold, higher pressure is required to move a given volume of it. The higher pressure may well cause pump and system difficulty. When oil is cold, solid matter tends to remain in suspension much more and solid matter which has dropped out of the oil is apt to be picked up and carried along into the burners. If the oil system is long and considerably involved it is considered good practice to install auxiliary heaters along the system to keep the oil temperature high. Cold oil is extremely difficult to atomize and excessive tip coking both inside and outside is to be expected.

A closed system in which hot fuel oil circulates constantly at steady pressure is universally recognized as a principal means for elimination of burner maintenance. Elimination of pressure pulsation may be had either by use of suitable surge chambers or through the use of a properly designed rotary pump, with the latter much to be preferred.

In the burning of oil a certain amount of erosion must be expected in burner parts. This problem usually becomes serious only as the erosion prevents turndown on the burner. The sizing of tip ports is largely empirical and is ordinarily based on experience of manufacturer. It is not at all unusual to see a burner in which the tip port area has doubled without seriously interfering with the operation of the burner.

If oil burners require cleaning or other maintenance at intervals of less than 5 to 7 days it is quite obvious that costs for maintenance are out of reason and steps to provide correction should be taken at once.

When a burner has been taken apart for maintenance it should be reassembled with care to see that each part is in proper location and that all internal fits and clearances are as the manufacturer intended they should be. Maintenance men should be especially trained for their work and entrusting this very important job to the average pipefitter is an open invitation to trouble not necessarily because the fitter just does not care but because he does not know the proper procedure. Proof of this point may be found in the case of a major refinery where a carefully selected crew took over maintenance on burners to reduce burner maintenance by more than 60 per cent.

Gas-Burner Maintenance

Gas-burner maintenance which usually involves corrosion, erosion, and destruction of burner parts by excessive heat can be largely eliminated through the use of proper materials and through burner design suited to the required service. All gas burners, regardless of manufacturer, are based on seven basic designs each of which has characteristics which may be either good or bad according to the job to be done.

If a burner which is best for service in a relatively cold furnace is being used in a very hot furnace the operator may expect maintenance costs to run high. If such a burner is replaced with one better suited the interests of economy will be better served. Further economy is to be realized through elimination of process upsets which may be far more expensive than maintenance labor and cost of replacement parts. Burners, fired with clean dry gas, reardless of the H_2S content of the gas should not require maintenance more than twice a year.

Corrosion may be checked through the use of suitable alloys and through the elimination of water vapor in the gas. Steels containing chromium or chromium and nickel such as 12-14 chrome, 18-8, or 25-12 do very well in point of resisting heat but a concensus of steel men will probably favor low nickel content where sulfur corrosion is to be expected. An alloy containing 29 per cent chromium and 3 per cent nickel has extremely good heat and corrosion characteristics but is available only in castings and is very difficult to machine unless suitable equipment is available.

Most burner-port stoppage may be traced to either corrosion or wet gas or to both. As has been pointed out, the corrosion may be checked through the use of the proper alloy but if wet gas flows into hot burner parts the heavier hydrocarbons are almost sure to coke and close the ports and passages in the burner. Only laboratory analysis of the matter removed from the burner ports can prove the cause of the stoppage but it may be accepted as a rule of thumb that gas containing H_2S or other corrosive gases is certain to attack brass, cast iron, malleable iron, and carbon steel.

Heavy hydrocarbons carried by gas may be removed rather easily through the use of a properly designed scrubber. The typical "knock out drum" common to most refineries is not to be considered a scrubber. Such drums will catch slugs of oil but do not interfere with the passage of oil mist which is equally bad for the burners. Any scrubber based on a combination of the "cyclone" principle and suitable baffles will probably be satisfactory.

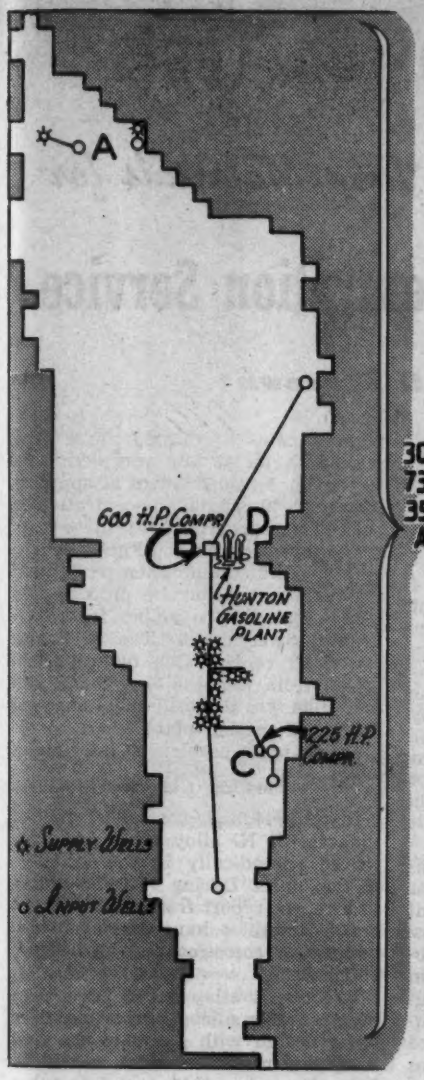
The arrangement of ports in a burner is a matter entirely in the hands of the manufacturer as also is the size of the ports. However, the operator may expect stoppage if small ports are used in a very hot zone unless suitable provision is made for cooling the metal through which the port is drilled. Generally speaking the use of a port smaller than ⅛ in. in a hot zone constitutes an open invitation to stoppage.

Destruction of burner parts by excessive heat may be checked through the use of suitable alloys. It is probable that the burner manufacturer, if advised of the difficulty, can furnish replacement parts which will justify their cost by serving much longer. At times mislocation of gas-burner parts may result in their destruction and here again the burner manufacturer can probably be of assistance.

Erosion in gas ports can be serious in that the enlargement of the ports upsets the pressure-turbulence characteristics of the burner as a whole to produce unsatisfactory flame conditions. A relatively small enlargement of a port can upset performance of a burner. A good indication of port enlargement may be found in progressively lowered gas pressure for maintenance of heat input when the heating value of the gas is fairly constant.

In burners which are provided with removable gas-limiting orifices a new orifice of proper size may be substituted for the one which is enlarged with very little difficulty, but if the enlargement occurs in a part bearing a plurality of gas-limiting orifices it is necessary to replace the entire part to get proper operation of the burner. It is wise to consider this factor in selecting burners.

Extensive Testing Feature Of Three-Part Gas-Injection Program at West Edmond



30,000 ACRES
737 Prod. WELLS
35,000 B/D
ALLOWABLE

by Leigh S. McCaslin, Jr.

To determine the feasibility of field-wide gas injection, a three-part pilot program is under way in Oklahoma's West Edmond field. At "A" on the map, high-pressure Bartlesville sand gas is being obtained from two dually completed wells and injected into the Hunton lime through two nearby wells. A 600-hp. compressor is being installed at "B," adjacent to the Hunton gasoline plant, to furnish gas for the second pilot project. At "C," a 225-hp. portable compressor is already in operation. "D" is the proposed site of the multimillion-dollar repressuring plant which will be necessary if the pilot program proves successful. Authorization has already been given to buy approximately a million dollars' worth of equipment for this big plant

A THREE-PART $500,000 pilot gas-injection program, with many interesting engineering and operating angles, is under way in Oklahoma's 30,000-acre West Edmond field—the nation's largest unit operation.*

With 6 months allotted for the program, the West Edmond Hunton Lime Unit (operated by Sohio Petroleum Co.) is undertaking pilot injection to determine the feasibility of a field-wide program. It is contemplated that as much as 20,000 M.c.f. of gas daily will be reinjected into the reservoir during the pilot project. With the field-wide program, it is anticipated that up to 110,000 M.c.f. may be put back into the reservoir.

If the pilot project should prove successful, the operator could be confronted with the bugaboo of slow delivery and nonavailability of equipment for the field-wide gas-repressuring plant equipment. It is important, of course, that as little time as possible elapse between the pilot and the field-wide program so that the maximum amount of oil can be recovered. Hence the operators involved in the unit have given authorization for the immediate expenditure of approximately a million dollars to purchase equipment in preparation for field-wide injection. In addition the operators have given their approval to the proposal that the W.E. H.L.U. design the plant necessary for the big program and advertise for construction bids.

Under the pilot program gas injection will be carried out in three portions of the field (see map). A 225-hp. portable compressor is already

(Continued on page 148)

This 225-hp. portable compressor was the first piece of equipment to be moved in for the pilot program. W.E.H.L.U. employes J. E. Bean, Fred Cain, and Norman Wilcox are doing the installation work

*"Nation's Largest Unit Operation Accomplishes Much in First Three Months," by Leigh S. McCaslin, Jr., The Oil and Gas Journal, January 1, 1948, page 44.

Corrosion Tests

of Heater-Tube Materials for

Acid Concentration Service

by H. F. Brown*

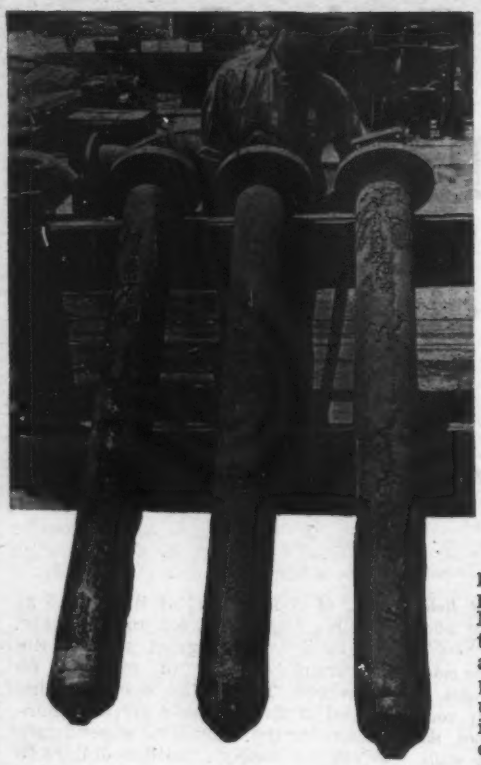


Fig. 1—Corrosion of cast silicon nickel alloy heater thimbles (from reboiler service)

IN the processing of petroleum products, sulfuric acid is being used to an increased extent. The problem of concentrating and recycling process acid has become an integral part of some of the processes, among them those from which alcohols and solvents of various kinds are derived.

When units of this type were built at one of the refineries of Esso Standard Oil Co., careful consideration was given to the materials of construction. On the basis of manufacturers' data and previous experience a silicon-nickel alloy with a nominal composition of 9 per cent Si, 4 per cent Cu and 87 per cent Ni was selected for the heater thimbles for the acid reboilers and concentrators which comprise essential parts of the units. This silicon-nickel alloy is acid resistant but must be cast to form and the resultant casting is brittle and cannot be machined readily. On these units the thimbles were heated with a salt vapor at 580° F.

The first unit was started in January 1943 and during the initial year of operation there was little apparent corrosion of the Si Ni alloy thimbles.

The first instance of severe corrosion of this material was found in February 1944 in the reboiler unit when a tube failed in the first compartment. The plant was continued on stream until April when it was shut down for inspection. On the startup, corrosion became so severe as to cause an extended shutdown. Weight losses of tubes in various compartments indicated that the maximum metal loss was occurring in the No. 1 compartment at approximately 55-60 per cent concentration of acid. The appearance of these corroded tubes is shown in Fig. 1. Severe corrosion was found when white acid was substituted for the process acid contaminated with copper from corroding tower plates. The acid also contained considerable quantities of nickel from the thimbles. Successful operation was resumed on 70 per cent acid from another plant where corrosion was not a problem at the time.

Battling Corrosion

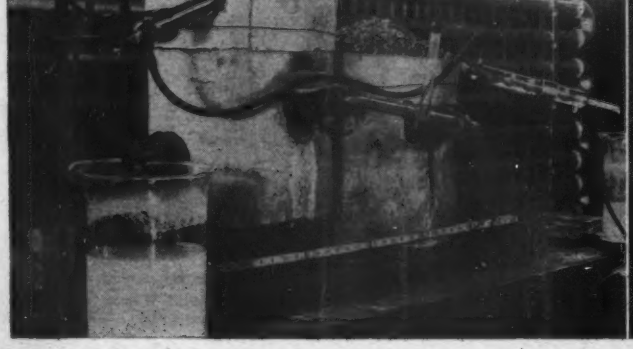
Since 1944 high corrosion rates of the cast Si Ni alloy tubes have occurred sporadically in the reboilers of two units. During 1946, according to a recent report from the field, 214 heater thimbles have been replaced because of corrosion and 42 because of cracking.

The Si Ni alloy tubes have been replaced with silicon iron or tantalum tubes heated with steam in the first compartment of several reboilers. Since December 1946, tantalum tubes have been used in the first compartment of the No. 2 reboiler.

To date, a completely satisfactory

*Materials division, Esso engineering department, Standard Oil Development Co.

Fig. 2—(Left) Two-cell acid concentrator used for corrosion tests of heater thimbles. Shown are acid feed pump at left and test thimble inserted in No. 1 cell. Fig. 3—(Right) Two-cell concentrator showing inlet to No. 1 cell and outlet from No. 2 cell. About 3 gal. of 45 per cent H_2SO_4 are fed per day. Each cell holds 1 gal.



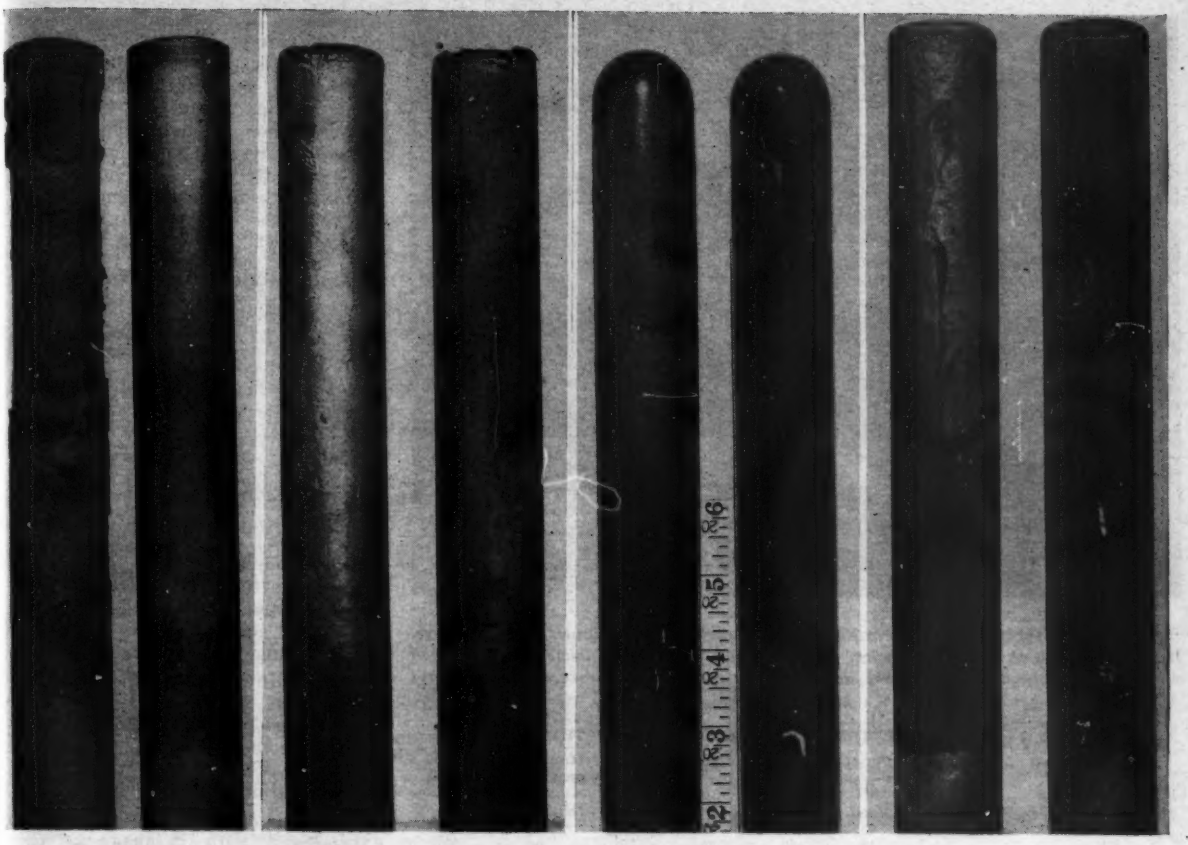


Fig. 4
55% H_2SO_4 and Isopropyl | 70% H_2SO_4 and Isopropyl

Fig. 5
55% H_2SO_4 | 70% H_2SO_4

Fig. 6
55% H_2SO_4 | 70% H_2SO_4

Fig. 7
55% H_2SO_4 | 70% H_2SO_4

Fig. 4—Silicon-nickel alloy thimbles after 21 days in laboratory concentrator. Corrosion rates 1.85 and .032 in. per year in left and right-hand cells, respectively. Both tests were on tenth run. Fig. 5—Appearance of iron molybdenum-nickel alloy thimbles after 12 days in the laboratory concentrator. Left-hand thimble is penetrated at the cap weld. Both tests were on twelfth run. Fig. 6—Appearance of glass-coated carbon-steel thimbles after 21 days in laboratory concentrator. The glaze has been affected on the left thimble, thirteenth run. Fig. 7—Severe pitting of composite Si Ni alloy fusion welded to wrought Fe Mo Ni alloy during 21-day run in laboratory concentrator. Fifteenth run

material for the heating thimbles for the acid concentrators has not been found and development work is continuing. Presented here are the results of the corrosion studies of various materials made in the engineering laboratory of Standard Oil Development Co. as well as the results of efforts on the outside to find suitable material.

Since published data, service life, and the results of beaker corrosion tests on the Si Ni alloys were conflicting, a small two-stage laboratory concentrator was set up in the Esso engineering laboratory to study this corrosion problem and to test materials for heater thimbles under simulated plant conditions. As shown in Figs. 2 and 3, this laboratory concentrator consists of two steel, lead-lined pots with ceramic inserts holding about 1 gal. so arranged that acid can be fed at a definite rate (approximately 3 gal. per day), concentrated acid removed by gravity and the water condensed and recovered. The heating arrangement consists of a 1½-in.-o.d. by 1-in.-i.d. by 12-in.-long thimble of the material to be tested. This thimble containing a 450-watt electric immersion heater is inserted into the cell through a packing gland and provides the total heat necessary to concentrate the feed acid. It is believed that the heat input per unit of surface on the test thimbles is approximately the same as on the reboilers where salt vapor at about 580° F. supplies the heat. The temperature of the test thimble in this apparatus is above that of the boiling acid or of a specimen suspended in boiling acid.

Test Run Procedures

Eleven test runs on cast Si Ni alloy thimbles were made in the above concentrator. Concentrations of the sulfuric acid during the first five test runs were held at 45 per cent feed acid, 60 per cent from the first cell, and 70 per cent from the second cell. On subsequent runs, the concentrations from the cells were held at 55 per cent and 70 per cent. The concentrated acid was diluted and recycled as feed acid.

During the first three runs, the concentrated acid from the No. 2 cell was diluted with distilled water and used as feed to the No. 1 cell. In subsequent runs the overhead water plus a small amount of distilled water was used for dilution. In addition, on runs Nos. 7 to 10, inclusive, a small quantity of isopropyl alcohol was added to the acid feed.

In the original design of the laboratory unit, the acid was fed into the concentrators at the top and removed by an overflow on the opposite side of the 8-in. diameter chamber. There were no baffles to force circulation of the fresh acid over the heater thimble. After the fourth run, baffles were installed to insure circulation and the acid was drawn off at the bottom where the concentration would be greatest.

All of the thimbles used in the first seven runs were from a single heat of Si Ni alloy. However, due to porosity the manufacturer replaced three

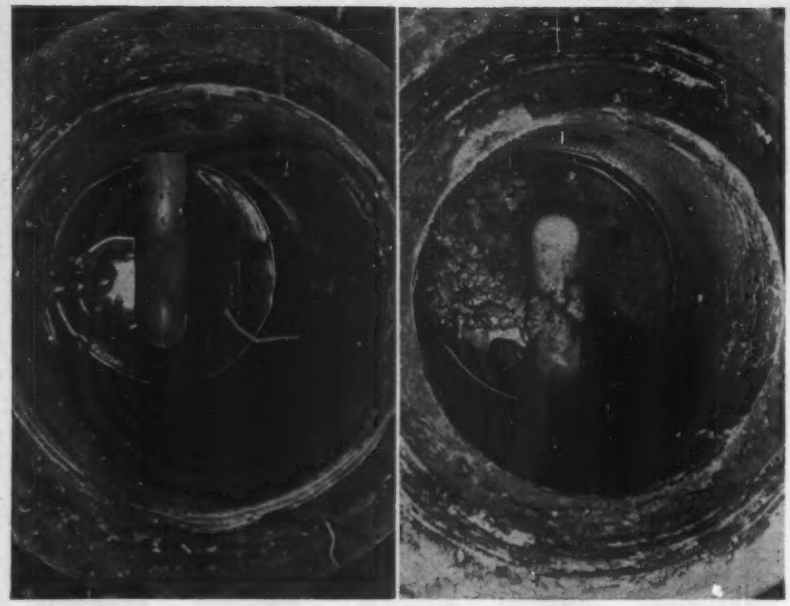


Fig. 8—(Left) Silver-coated thimble in No. 1 cell of laboratory concentrator after 5½ days. Note redeposition of silver at pinholes. Fig. 9—(Right) Silver-coated thimble in No. 2 cell of laboratory concentrator after 5½ days. Severe corrosion and redeposition of silver has occurred

TABLE 1—RESULTS OF TEST RUNS ON SI NI CAST THIMBLES

Run No.	Acid used	Per cent acid concentration: Feed	Outlet cell No. 1	Outlet cell No. 2	Time (days)	Corrosion rate ins. penetration per year: Cell No. 1	Cell No. 2
1	CP	45	60	70	3½	*25.0	.25
2	CP	45	60	70	19	.04	.08
3	Ethanol	45	60	70	20	.08	.085
4	CP	45	60	70	21	.04	.11
5	CP	45	60	70	21	.07	.09
6	CP	45	55	70	21	.06	.08
7	CP+I†	45	55	70	21	.042	.036
8	CP+I†	45	55	70	21	‡1.76	.11
9	CP+I†	45	55	70	21	.056	.016
10	CP+I†	45	55	70	21	‡1.85	.032
11	CP	45	55	70	21	.16	.055

*The high corrosion rate indicated was due to complete penetration of the tube in 3½ days. This penetration occurred locally where the tube had been repaired by welding by the manufacturer. †Five per cent of isopropyl alcohol by volume was added to the 45 per cent feed acid and 2½ per cent isopropyl was added to the recycle acid when diluted to 45 per cent. ‡The I.P.Y. calculated from measurements of the deepest pits. The weight loss in run No. 8 was about half the loss in run No. 10 but the depth of pitting was about the same in each case.

of the original thimbles from a different heat. On run No. 8, which was a duplicate of run No. 7, except that the thimbles were from the second heat, high corrosion rates were noted. Runs Nos. 9 and 10 were duplicates of runs Nos. 7 and 8 respectively and the results were in agreement. High corrosion rates occurred on thimbles from the second heat and low rates on the thimbles from the first heat.

The results of the test runs on the Si Ni cast thimbles are shown in Table 1.

During test run No. 7, disks of the Si Ni alloy were suspended in the acid in each cell. The results of these tests showed lower corrosion rates than on the heater tubes and are given in Table 2.

TABLE 2

Cell No.	Acid strength (%)	Time (days)	Corrosion ins. penetration per year
1	55	21	.018
2	70	21	.035

Corrosion test on Si Ni alloy disks were also run in glass flasks fitted with reflux condensers using three strengths of boiling CP acid. The highest corrosion rate after a test period of 25 days occurred in the strongest acid. The result of these tests are given below:

TABLE 3

Acid strength (%)	Corrosion ins. penetration per year
54.4	.029
60.2	.021
70.0	.065

Until runs Nos. 8 and 10, severe corrosion on the Si Ni alloy was not experienced in our laboratory tests either in the concentrator or in beaker tests. On these runs severe corrosion occurred in the 55 per cent acid although thimbles from the same heat did not corrode unduly in the 70 per cent acid. Fig. 4 shows the appearance of the thimbles from run No. 10. This corrosion in the 55 per cent acid is typical of that which took place on the thimbles in the field. Neither a study of the microstructure nor a qualitative spectrographic analyses of the thimbles from the two different heats showed any dissimilarity between them. Chemical analyses of the two heats are shown in Table 4.

TABLE 4—CHEMICAL ANALYSES OF HEATS

	Analyses of specimens (per cent): Severely corroded	Normally corroded
Silicon	8.86	8.51
Carbon	.14	.15
Chromium	.05	.14
Iron	.15	.85
Manganese	.54	.56
Copper	4.32	3.78
Nickel	bal.	bal.

Subsequent laboratory studies by the manufacturer indicated that both heats showed similar tendency to pit in 55 per cent H_2SO_4 as did other heats having less copper.

In run No. 11 a thimble from the heat of cast Si Ni alloy which had high corrosion rates in runs 8 and 10 was subjected to CP acid and the corrosion rate dropped to 0.11 in. penetration per year.

By this time difficulty was being experienced with breakage of this alloy in the reboilers. The Esso engineering department extended the scope of the test program to determine the feasibility of using a glass or ceramic coating on alloy tubes, Si Ni alloy coating on an iron, molybdenum nickel alloy or silver-coated tubes. It was believed that composite tubes with a ductile core would eliminate breakage. Silicon-impregnated steel tubes were also tested.

The manufacturer made a series of beaker tests of wrought and cast Fe Mo Ni and cast Si Ni alloy in boiling 55 per cent H_2SO_4 which showed that during 48-hour periods the wrought Fe Mo Ni alloy had consistent losses indicating penetration rates of 0.0012 to 0.0044 in. per month while the Si Ni had erratic losses up to 0.173 in. per month.

Accordingly, wrought Fe Mo Ni thimbles were tested in the laboratory concentrator (run No. 12) using 45 per cent feed acid and holding 55 per cent and 70 per cent concentrations from Nos. 1 and 2 cells, respectively, for about 12 days when penetration occurred. The rates calculated from the weight losses (actual depths were greater) were 0.0515 in. per month in No. 1 cell and 0.0467 in. per month in No. 2 cell. These rates are 12 to 43 times those found in the reported beaker tests and may be attributed to the use of the material as a heating medium. Fig. 5 shows these thimbles after 12 days. The

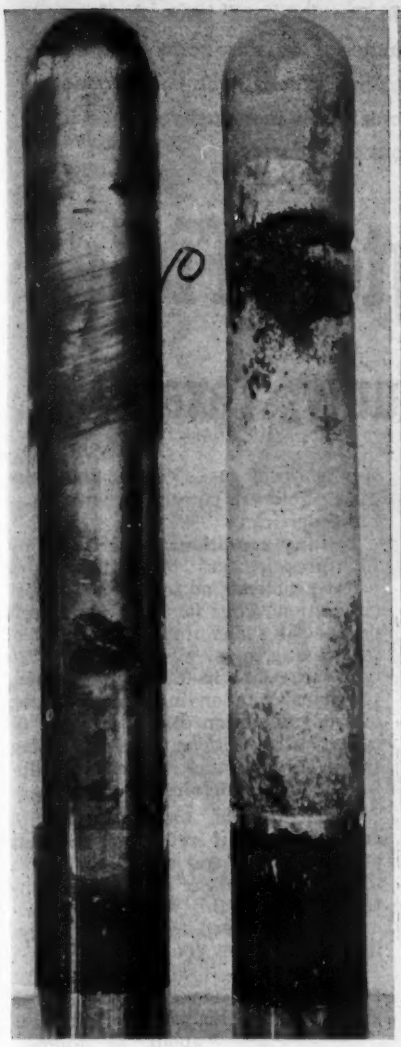


Fig. 10

55% H_2SO_4 70% H_2SO_4

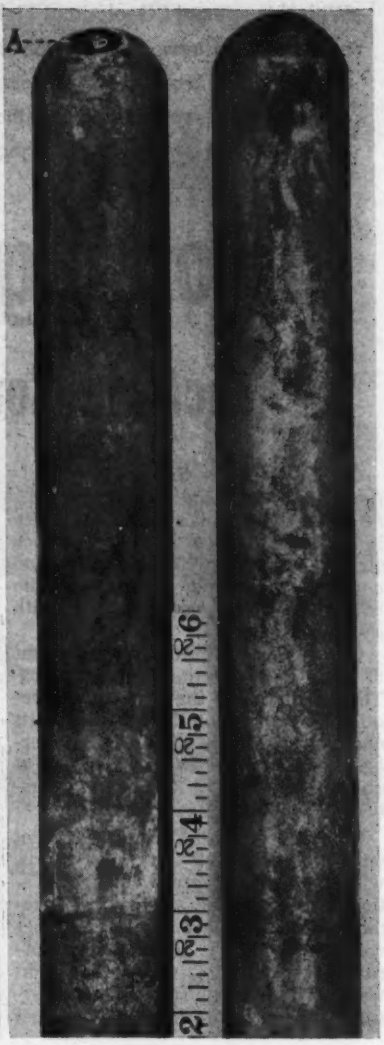


Fig. 11

55% H_2SO_4 70% H_2SO_4

Fig. 10—Appearance of silver-coated carbon steel heater thimbles after 5½ days in the laboratory concentrator. Note the total loss of silver in right-hand thimble. Fourteenth run. Fig. 11—Silicon-impregnated carbon-steel thimbles after 100 hours in laboratory concentrator. Note failure of left thimble at A. Sixteenth run

nominal analyses of the Fe Mo Ni alloy was:

Iron—4-6 per cent.
Molybdenum—25-35 per cent.
Nickel—60-65 per cent.

When the possibility of glass coating thimbles was first considered, three of the leading companies applying glass coatings were of the opinion that the high-alloy base materials could not be coated. A pair of carbon steel thimbles coated with approximately 0.030 in. of glass were obtained and tested in the laboratory concentrator for a 3-week period (run No. 13) under the conditions given above. Fig. 6 shows the appearance of the thimbles after test. The glaze was lost on part of the thimble in 45-55 per cent acid but the glass was relatively unaffected. The results indicate that in the absence of thermal or mechanical shock the glass coating will withstand the effect of the acid.

Glass Coated Material

Subsequently, both the Si Ni and Fe Mo Ni alloys were successfully glass coated. Test runs on these thimbles in the laboratory concentrator corroborated the results obtained on the glass coating applied to carbon steel.

After considerable discussion, the manufacturer provided several wrought Fe Mo Ni tubes coated with Si Ni alloy by a fusion welding process. These tubes were subjected to the usual 3-week period in the laboratory concentrator (run No. 15). The appearance of the tubes after test is shown in Fig. 7. Although the weight losses were not excessive, 29 and 42.5 g., respectively, and the abnormally high corrosion previously found on the Si Ni alloy did not occur, the tubes were almost penetrated at isolated pits between the weld layers. Because of this condition and the high cost of applying the alloys by fusion welding, this method of coating is not deemed feasible.

To determine the corrosion resistance of silver in acid concentrator service, carbon steel thimbles with a 0.040 in. "pore free" coating of electrode-deposited silver were tested during the fourteenth run of the laboratory concentrator. At the end of 5½ days excessive amounts of iron and silver appeared in the circulating acid and the cells were opened. Figs. 8, 9, and 10 show the condition of the cells and thimbles, respectively. It would appear that corrosion of the silver was accelerated when the base metal was exposed. In this particular run, a composition packing was used to electrically insulate the silver from the metal cells.

Recently silicon impregnated carbon steel thimbles were tested in the laboratory concentrator. The silicon-impregnated tubet subjected to 45-55 percent H_2SO_4 during the sixteenth run, failed as shown in Figs. 11 and 12 in about 100 hours. The failure apparently resulted from a defect in the silicon impregnation as there was no appreciable corrosion except at the small area shown. The thimble from the second cell (55-70 per cent H_2SO_4) relocated in the No. 1 cell (45-55 per cent H_2SO_4) in a subsequent test, showed no appreciable corrosion.

The effect of carbon and graphite

(Continued on page 149)

Fig. 12—Enlarged view of failure in thimble (shown at A of Fig. 11)

JOURNAL-*Guide* TO

With this special "Geological Field Development" issue, the Journal introduces a new feature—the material on this page is the first article of the continuing series. The reports will cover general drilling and development conditions in the more active of the new fields throughout the country.

Bloomington Field

Victoria County, Texas

BLOOMINGTON FIELD, Victoria County, Texas, is the scene of the most active drilling campaign in the entire Gulf Coast region, with over 20 locations and 5 to 7 rigs running. (See regional and local maps.)

Pays.—There are two pays in the field, the main one, the Greta Massive (Heterostegina) at around 4,600-4,700 ft., and the "4,900-ft. sand," a Frio pay. In Amerada Petroleum Corp. 2 Grant, the Greta Massive was topped at 4,596 ft., perforated at 4,655-60 ft., and the 4,900-ft. sand was checked at 4,902-07 ft.

Wells are not dually completed, but where both pays are present, a twin is drilled. A 20-acre spacing pattern has been established for the Greta Massive pay; a similar pattern for the 4,900-ft. sand is probable, but has not been definitely established. A sizable portion of the field lies within the townsite of Bloomington, complicating the spacing pattern.

Casing and bits.—Subject to the difficulties of obtaining the desired sizes of pipe, the standard casing pattern is 1,000 ft. or more of 9⅝-in. surface string, cemented with 500 sacks; and a 5½-in. oil string, set through the bottom pay, and also cemented with about 500 sacks.

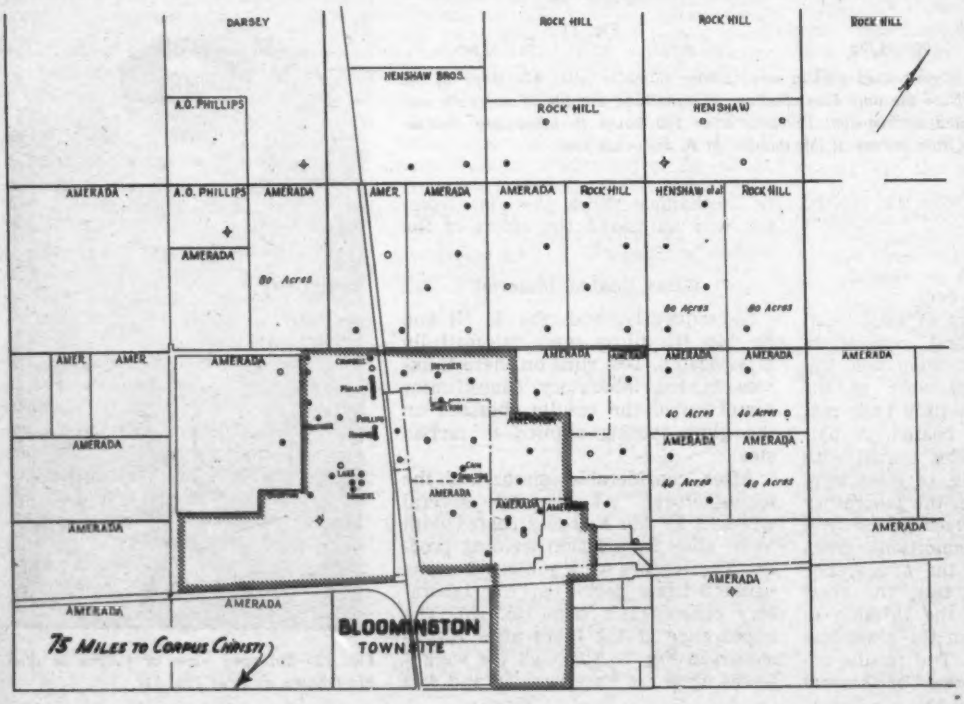
One 12½-in. fishtail bit is sufficient to drill hole for the surface string. The remainder of the hole usually requires about four 8¾-in. drag bits and two 8¾-in. rock bits. The average hole requires 50 to 100 sacks of aquagel and 2 to 3 sacks of quebracho for mud-mixing control.

Contract terms.—Contracts are let on a footage-plus-day-work basis, with the operator preparing the location. The operator also supplies cement, pays for the mud, and supplies water, although contractor must arrange for pumping water. The contractor supplies the substructure, derrick, and arranges for his own fuel supply (local gas). Most of the units in the field are power rigs with jack-knife derricks.

Drilling conditions.—There are no high-pressure gas or high-pressure water problems; no troubles with lost circulation. Thus far there have been no special shale problems; no heaving, caving, or sloughing. With little or no true lime in the section drilled, problems common in other districts; loss of circulation due to crevices or cavernous conditions, or slow drilling through hard limes, are not encountered at Bloomington.

Some trouble may occur with crooked holes if proper precautions are not taken, and deviation checks made at least every 500 ft. Such little trouble on this score as has occurred is believed to be due to trying to make hole too fast.

The best time to date on a well is 16 days, but 17 to 19 is probably a good average. This would break down about as follows: Rigging up—2 days; drilling (bit on bottom) 6 to 8 days; running casing and waiting on cement—4 days; company time for coring and logging—3 to 4 days.



Companies.—Amerada owns the bulk of the acreage, and has five contract rigs running, three by Carl Short, Inc., and two by Dickson Drilling Co. Other operators owning leases are Lester Cain, Henshaw Bros., George & Wrather, and Monday Oil Co. There are also some other interests, mostly small, due to a part of the field lying within the townsite of Bloomington.

Two men carrying 40-ft., 6-in. joint of aluminum pipe weighing 262 lb., in comparison with 758.8 lb. steel joint for same purpose

by Paul Reed

Interstate Lays First Experimental Section Of Welded Aluminum Pipe Line

THE first welded aluminum pipe line laid for crude-oil service is a ½-mile section of 6-in. pipe which has been constructed early this month for Interstate Oil Pipe Line Co.'s system in the Magnolia, Ark., area. On April 8, a 1,000-psi. hydraulic pressure test was applied on completion of welding the initial 1,200-ft. section of pipe for this project.

An additional ½ mile of 4-in. aluminum pipe is to be welded upon completion of the 6-in. section. These two sections of pipe line in the Magnolia area will replace steel pipe which has been badly corroded internally in sour-crude-oil service. Later this month a ½-mile section of 4-in. aluminum pipe is to be laid in the Delta Farms area of the Louisiana Gulf Coast, where severe external corrosion from brackish water is encountered by existing pipe lines. The aluminum test was conducted under the direction of the Interstate Oil Pipe Line Co. staff. The field operations were supervised by William Law, assistant superintendent, and George Crain, engineer, both of the southern division of Interstate Oil Pipe Line Co. Engineering and technical direction were given by Joe C. Rawlins, acting chief engineer, and Francis Coryell, research and development engineer, of the Tulsa general office. B. J. Fletcher, chief engineer, development division; G. O. Hoglund, chief welding engineer, and M. R. Rivenburgh, welding engineer, all of Aluminum Co. of America, supervised the welding operations and furnished technical assistance.

Spiral-shaped filler-rod held in welder's left hand during welding of aluminum pipe

Test of Utility

These Interstate experiments were to test the ability of aluminum pipe to resist the internal corrosion of sour crude and the external corrosion of corrosive soils. Furthermore, they are a step toward determining the future economic possibilities of aluminum pipe for serving the petroleum industry.

Pipe for this project was manufactured by Aluminum Co. of America in 40-ft. seamless joints. The 6-in. pipe has a wall thickness of .280 in. and the 4-in. pipe a wall thickness of .237 in. The weight of the 6-in. pipe is 6.55 lb. per ft., and the weight of the 4-in. pipe, 3.73 lb. per ft. The pipe is manufactured by an extrusion process which not only makes it seamless but also produces pipe that is extremely smooth both inside and out. The ends of each joint are factory beveled at 55°, but the field experience at Magnolia showed that a 30° bevel would be adequate for roll-welded joints.

The pipe being laid by Interstate is the 63S-T6 alloy which has the following chemical analysis: Aluminum,

Left: Welding flange on 6-in. aluminum pipe with two kinds of alternating current and argon gas cloud. Right: Normal welding positions of water-cooled welding head with tungsten electrode, in welder's right hand, and filler-rod coil, in his left hand, as seen just before welding starts

89 per cent; magnesium, 7 per cent; and silicon, 4 per cent. The minimum tensile strength of unwelded pipe is 32,000 lb. and the yield strength, 25,000 lb. Welded joints efficiency may be taken as 60 to 65 per cent of the ultimate strength, or approximately 20,000 lb. This gives 6-in. pipe of the wall thickness used by Interstate a bursting strength of 1,800 psi. hydraulic pressure.

Welding is done by the inert-gas arc-welding process, having such unusual features as the use of two kinds of alternating current and an argon gas cloud fed around a tungsten electrode contained in a water-cooled head.

Welding Technique

"Inert-gas arc welding" is the American Welding Society's designation of the process used in fabricating Interstate's aluminum pipe lines. This process is called Heliarc by Linde Air Products Co., Inertarc by General Electric Co., and Heliweld by Air Reduction Co., according to Aluminum Co. of America's technical men supervising the Interstate installation.

The inert-gas welding process has several distinctive features:

1. Alternating current, instead of the direct current common for steel welding, is used since it facilitates making a better puddle of molten weld metal.

2. Operations are carried on with two kinds of alternating current:

(a) 250 amp., 82 volt, 60 cycle for the electric arc.

(b) High frequency (2-3 megacycles) to stabilize the arc, thus avoiding sputtering.

3. Since welding operations are shielded by a cloud of argon gas, the difficulties incident to using a flux in welding aluminum are avoided. This is particularly important in overhead welding. Argon gas is supplied from a cylinder to feed around the electrode.

4. A nonconsuming electrode of tungsten is used.

5. The welding head is cooled by water circulating from the radiator of the welding machine in order to prevent the 800°-900° F. argon flame from melting the brass fittings.

6. A filler rod made in the form of a wire coil is 0.95 aluminum and 0.05 silicon.

Top: Alternating current machine for welding aluminum; the argon cylinder is mounted on the far side of the unit. Bottom: Pumping water into the first welded section of 6-in. aluminum pipe preparatory to a successful test on Interstate Oil Pipe Line Co.'s system. The next section was laid in the ditch full of water in foreground. Arkansas Fuel Oil Co., Magnolia, Ark., plant in distance

7. A stainless steel backup ring is used inside this pipe. Chill ring application was also tested on the project.

The welding machine used was built by Hobart Brothers Co. and is the first gasoline-engine-driven portable unit used for field welding with the argon-gas process. The alternating-current generator driven by a Chrysler engine has various attachments necessary for the process. These include electrical devices to provide the high-frequency alternating current, an additional water pump to circulate the cooling water to the torch, and automatic valves to control the flow of argon gas. While the generator has a 300-ampere rating, the actual amperage used in aluminum welding is from 200 to 225 amperes because heat is rapidly conducted away by aluminum.

The procedure used by Interstate on the test sections is to triple joint by roll welding on skids over the ditch and then tie in with bell-hole welding. Prior to welding, the end joints are cleaned with carbon tetrachloride. Three or four tack welds are made and the weld is completed with two beads. The first bell-hole welds required 45 minutes' welding time, but this was quickly reduced to 20 minutes per weld. Roll welds were made in 15 minutes at the start and reduced to about 12 minutes.

Couplings and Bending

To couple the aluminum pipe sections into the steel pipe line, flanges are used. Copper aluminum alloy flanges with heat-treated and anodized bolts and nuts were furnished by Tube Turns, Inc., who also furnished mating steel flanges. Aluminum flanges are welded to the aluminum pipe and steel flanges to the steel pipe. Insulation is used between the flanges and around the flange bolts to prevent electric currents from the setup.

Bending of aluminum pipe is satisfactory when this is done at points away from the welds.

To test resistance to external corrosion, the aluminum pipe at the Magnolia project of Interstate has been coated in sections amounting to about 50 per cent. The coating applied is Rustban No. 327, made by Humble Oil & Refining Co., which is wrapped with Johns-Manville asbestos felt. The remaining 50 per cent is left bare.

Since an aluminum pipe line is regarded as costing considerably more than steel, the applications for this material to be first sought in petroleum pipe lining would naturally be in areas where the advantages of aluminum in resisting internal corrosion of sour crudes would offset its higher cost above that of steel. Aluminum pipe may also have a place in sweet-crude service due to its ability to resist external corrosion under certain conditions. Steel pipe will generally corrode in acid soils and aluminum pipe in alkaline soils. Therefore, where steel pipe may require the best coating available, the aluminum pipe might be laid with little or no protection. On the contrary, aluminum pipe laid in soils that have not been corrosive to the steel pipe may suffer from corrosion.

There are several advantages in aluminum because it weighs a third as much as steel. A 40-ft. joint of 6-in. aluminum pipe weighs only 262 lb. while steel pipe of the same size weighs 758.8 lb. Such a joint of aluminum pipe may be carried by two men.

Both the Interstate and Alcoa organizations are concerned with aluminum pipe lines from a long-range point of view. During the past year and a half, the steel shortage has stimulated a wider utilization of aluminum.

The inert-gas arc-welding process developed in World War II has opened new opportunities for aluminum welding in industry. Now it is used most extensively in welding beer barrels and also on a large scale in fabricating aluminum furniture. Tanks and pressure vessels for synthetic plants will be built by aluminum.

Aluminum pipe in 20-ft. joints has been flown in airplanes and dropped by parachute to supply military pipeline construction. There has been some speculation regarding the possibilities of transporting such pipe by airplane to inaccessible drilling wells where it might be used for water lines.

Interstate's experimental test of aluminum is believed to be the first extensive effort to test a new material for high-pressure pipe-line operation since the general adoption of steel for petroleum pipe lines in the early history of the business. The project represents a significant effort to study the advantages of a higher-priced metal for combating certain types of corrosion and for other field applications during this period of steel shortage.

Surveying—In Brush Covered Country

(Continued from page 123)

developed during the war, is mounted on a jeep or similar vehicle. It consists essentially of three parts:

1. A magnetic compass which reads the magnetic heading of the jeep.

2. An auxiliary speedometer cable for measuring the distance traveled.

3. A computing device and plotting table (see Fig. 1) which combines the readings taken by the compass and the speedometer cable and converts them into distances traveled North-South and East-West. These distances are made visible to the odograph op-

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erator in two ways. First, the number of miles N-S and E-W are shown on Veeder counters mounted at one end of the plotting table. Second, the N-S and E-W distances moved are communicated to a pencil which plots the vector sum of these distances to an appropriate scale and marks them on a sheet of paper or map. The scale to which this plotting can be done may be varied over a wide range, the largest being 2,000 ft. to the inch.

The result is a map (see Fig. 2 for typical map) to the desired scale of the route taken by the vehicle. The pencil can be set initially on any desired point. In practical use, the required shot points and one or two known points are plotted to the desired scale and this map is put on the odograph plotting table. The odograph operator starts at one of the known points, places the pencil on that point on the map, starts the odograph mechanism and, by watching the pencil move, guides himself to the first of the unknown points. He uses, and flags, existing trails if possible but detours caused by rough terrain or obstacles such as fences make little difference. He goes around them and back to the desired point. As he comes to points which it is desirable to record, such as gates and windmills, he can lift the cover of the odograph and make a suitable designation on the map.

The accuracy of setting points depends to some extent on the skill of the operator, but in dry weather, across the brush-covered country of the Edwards plateau, a trained operator can preserve an accuracy of 100 ft. in 5 miles of traverse. Field trials have demonstrated that closed loops are not necessary.

Phase 2.—Once the shot points are established and the route between them flagged, they may be established accurately by a special modification of the stadia method. In this, both the rod and the observer are, by means of truck-mounted towers, kept 20 ft. from the ground, thus enabling the line of sight to be unobscured by the brush. The survey is made by the traverse method, shots being between 3,000 and 4,000 ft., an accuracy of 1½ ft. in 3,000 ft. being aimed at. The stadia rod is 40 ft. long, mounted horizontally at the top of the tower, and will fold against the side of the tower for moving purposes. Both towers may be lowered into a horizontal position for moving (see Fig. 3). Instead of reading distance on the rod intercepted by stadia cross hairs, the rod length is kept constant and the angle subtended is measured.

In order that sufficient contrast is obtained between the fiducial marks on the rod and the background, especially through heat waves on hot days, the "marks" are the filaments of 50-cp., 6-volt lamps shielded by a brass cover through which ¼-in. holes are punched to serve as diaphragms.

Mechanical Design of Towers

There are several limitations on the tower design which are set by the field operating conditions. Some of these are:

1. The truck must be able to traverse practically any kind of terrain.
2. When lowered into the horizontal position, the over-all height of the truck and tower must be less than that required to pass under the strain wire which crosses above many fence gates.
3. The truck width must be narrow enough to go through the many narrow gates encountered.
4. The mechanism for setting up the tower must be simple, mechanically dependable, and fast.
5. The tripod on which the instrument is mounted must essentially be separate from the tower on which the observer stands.

The height limitation was met by mounting the tower on the front of the truck, so that the observer's platform will fit in the space behind the driver's cab. If mounted on the back of the truck, the platform, in the lowered position, will either have to be above the cab or will interfere with the driver's vision.

The tower is raised and lowered by

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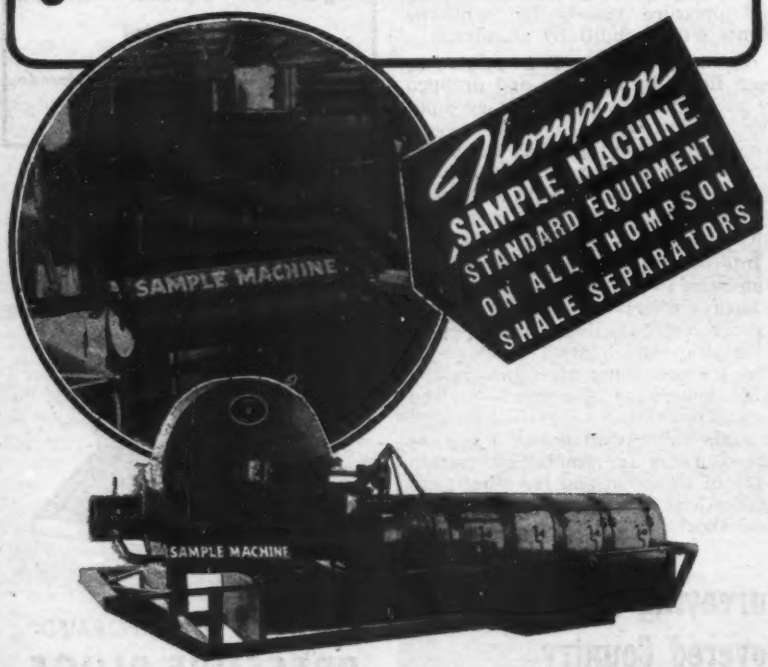

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the front end winch of the truck, and the setting-up time is but a small fraction of the total. The inner tripod, on which the instrument rests, may be clearly seen in the photographs (Figs. 4, 5, and 6).

Accuracy of Surveying

The measurement of 3,000 ft. with an accuracy of 1½ ft. necessitates the knowledge of the stadia rod length to 1 part in 2,000, and it must stay constant within this limit. For a 40-ft. rod, the length must be constant to within ¼ in. and must be observable with that accuracy. Under normal climatic conditions the thermal expansion of the aluminum arms used during a day is just within the limit, for a given time of the year.

The stadia length is measured from time to time to insure that it has not changed by accidental knocks, fatigue of supports, etc. Some seasonal effects will be noticed.

Leveling and setting the arms at right angles to the line of sight of the observer are important, but no very great accuracy is required. If the arms are set and leveled to 1° an accuracy of 1 part in 5,000 is maintained. Adjustments are therefore made by using a preset peepsight for the line of sight and an insensitive bubble for level.

The accuracy required demands that a theodolite (which will read all angles to better than 1" of arc) be used.

number of connections which have to be broken when tearing down have been reduced to a minimum. For example, only four hammer unions have to be disconnected to separate the substructure and the mud-pump skid. Hammer unions and sleeve couplings have been used almost altogether in the places where it is necessary to break connections for moving. The sleeve couplings have been utilized so as to allow a little play in setting the distances between major items of equipment.

The two steel mud tanks are designed, one smaller than the other, so that they can be nested for moving. The chemical mixing barrel and shale shaker are located on top of the shale pit. The mast is so designed that by removing six bolts after it is lowered it is broken down into two parts which fall within highway load regulations.

Further portability has been obtained by constructing the boardwalk in two sections which can be set side by side on a truck and loaded with rig-up pipe and lumber. Adjustable steel pipe racks have been fabricated to eliminate the necessity of building or rebuilding wood racks in each new location.

The mud pump and its prime mover, along with a 240-gal. fuel tank, have been skidmounted as one unit. In addition, the draw works and its

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New Portable Rig for Shallow-Well Drilling

(Continued from page 125)

of the working components of the rig. Included as a part of the substructure are: a unique tool box, 540-gal. lube-oil tank, 1,150-gal. fuel-oil tank, light plant, washdown pump, mud lines, and an auxiliary air compressor. Also, the tong weights are permanently located and operate in the substructure (safety feature).

Perhaps the most unusual component of this substructure is the tool box, which can be seen in an accompanying illustration. This tool box, which is located directly behind the rotary table toward the draw works, has proved quite successful in reducing rig-up and tear-down time. The lid of the tool box forms a part of the drilling floor when closed. The cat line is used, when necessary, to load the slips, subs, bits, tongs, and auxiliary equipment into the box. This quick means of storing tools for a move is highly appreciated by the drilling crews and a factor they often mention in commenting on the new rig.

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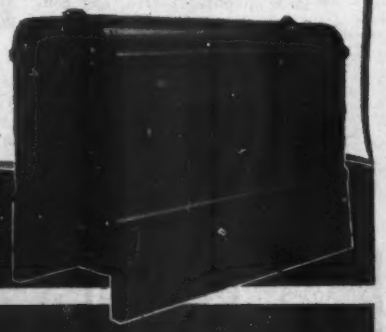

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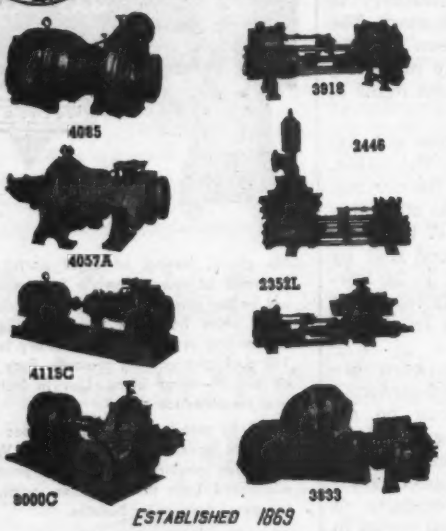

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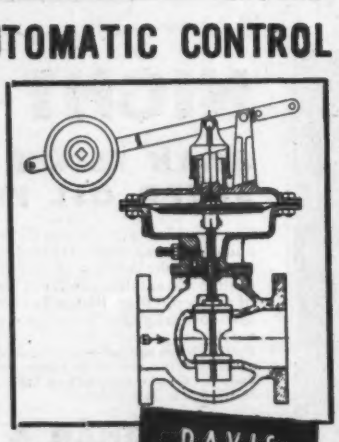

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prime mover are also skidmounted and can be removed from the substructure during movement if load conditions make it advisable.

The portable features result in making possible moving the entire rig, including drill pipe for a 4,000-ft. hole and water tank, in 10 truck loads—six 5-ton truck loads and four 1½-ton loads. These 10 loads are broken down as follows:

5-ton loads:
1. Substructure.
2. Draw works and tool house.
3. Mud pump, rotary table, swivel, and blocks.
4-6. Drill pipe.

1½-ton loads:
7. Mast.
8. Board walk and pipe racks.
9. Mud tanks.
10. Water tank.

12 Hours to Rig Up

Proof that Service Drilling has accomplished its aim of a highly portable rig is given by the time figures for recent moves. One four-may crew can tear down and stack in 8 hours. Under average conditions for a good location, it is possible to rig up with three crews working together for 8 hours and two crews on duty for 4 hours. In other words, 12 hours after reaching a new location the bit is turning. The third crew, which is not active on the second 8-hour tour, takes over on the third tour after reaching a new location and thereafter the crews rotate in the customary manner.

Safety features of the new rig have been appreciated by insurance-company inspectors who have given it a high rating in their reports.

The rig was first put into operation last November and is now on its fifth well, the Grover C. Baker 1 Baker, 9-14n-15e, Okmulgee County, Oklahoma. Previous wells include three development wells for Kewanee Oil Co. in North Burbank field, Osage County, Oklahoma, and a wildcat for Olson Drilling Co., Tulsa, the 1 Beymer, SE 11-9n-10e, Hughes County, Oklahoma. The latter test, which was located in the bend of the North Canadian River several hundred feet from U. S. Highway 75, is the location on which the pictures shown here were taken.

In addition to his unusual rig, Smith has devised a unique drilling record which he maintains on all wells drilled and furnishes his clients. The name "Service Drilling Record," for which a copyright has been applied for, has been given the chart (see accompanying sample). Among the information shown is a geological log, time-vs.-depth curve, coring record, deviations, bits used, cement and pipe record, and a space where the client may add radioactive, electrical, or any other logs obtained. The Servive Drilling Record is bound into a specially printed folder, along with typewritten driller's log, geologist's log, and detailed core information, and is presented to the client as a complete record of the well.

Service Drilling Co. is a new entrant into the drilling contracting business, having been incorporated only last August. Officers of this young concern are E. A. Smith, president, J. L. Crawford, secretary-treasurer, and Ted Wade, superintendent in charge of drilling. Ed Smith is well known in Mid-Continent circles, having been drilling and production superintendent for Portable Drilling Co. of Tulsa before going into business for himself. He started out in the oil business before the first World War with Roxana Petroleum Co., remaining with Roxana and Humphrey Corp. until 1924. At that time he went into business on his own and had tools and production in the Mid-Continent area, primarily in Oklahoma. He joined Portable in 1939 and remained there until the formation of Service Drilling Co. J. L. Crawford has an extensive oil-country background including 18 years in the Tulsa office of the production department of Carter Oil Co. and 8 years (1939 to 1947) as an independent operator. Ted

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Wade has a background of 15 years in rotary drilling and worked for Portable Drilling Co. prior to joining Service.

This young drilling company, as have so many contractors, has added some production to its assets. This production was brought in late last year with a company rig of a half section of acreage in Panhandle field, Hutchinson County, Texas. To date two wells have been drilled on the property, both producers, with an allowable of 51 bbl. daily per well. Reservoir engineers have estimated that there is at least 1 million barrels of oil underlying the half section.

Equipment List

The following is a list of some of the major equipment items used on Service Drilling Co.'s rig:

Unit Rig & Equipment Co. Model U-34 draw works with Twin Disc Series 10,000 torque converter.

Lee C. Moore Corp., fabricated substructure and mast.

General Motors Corp., six-cylinder, Model 6-71 diesel engines.

Emsco Derrick & Equipment Co. C-12, 7¼ by 12-in. power slush pump.

Byron Jackson Co. Type MAA 4½-in. rotary drill-pipe elevator, No. 460 rotary hook, and Type C rotary tongs.

Cameron Iron Works, Inc., Type C weight indicator and Type D, 3,000-lb., mud-pump gage.

Chiksan Co. high-pressure mud-mixing guns and swivel joint.

Baash-Ross Tool Co. 5½ by 7-in. Type C drill-collar slips, Type DU drill-pipe slips, 4¼-in. square kelly, Type DB 320 traveling block, and 10¾-in. split rotary bushing.

Wilson Manufacturing Co. XH 10¾-in., side-door elevator.

Oil Well Supply Co. oil-bath swivel.

International Derrick & Equipment Co. 425 RKD, 135-ft., roller, kelly drive bushing, and 17¼-in. streamlined rotary table.

W-K-M Co. "Sure Shot" deviation instrument.

Halliburton Oil Well Cementing Co. M300A reel assembly.

Link-Belt Co. NRM-124, Model 45, mud screen.

West Edmond Program

(Continued from page 133)

in operation in the south central portion of the field—a relatively low-pressure area (800 psi. reservoir pressure). Installation work is under way (contractor—O. L. Olsen, Houston) for a 600-hp. compressor to be installed adjacent to the Hunton gasoline plant which is near the center of the field. Gas for these two projects will be that produced with the oil from the Hunton lime. For the third project in the north end, Bartlesville sand gas will be obtained from two dually completed wells.

Helium Tracer Program

In order to check on the results of the gas injection, the W.E.H.L.U. plans to use helium as a tracer during the pilot project. Use of helium as a tracer was initiated by the U. S. Bureau of Mines after it had developed a rapid and accurate method for analyzing the helium content of gases. It was first used in Elk Hills field of California in 1945, and has seen use several times since then.

Helium, delivered to the field from the Amarillo plant of the Bureau of Mines, is expected to cost around $19 per M.c.f. Transportation from Amarillo will be by special tank car and truck semitrailer. A portable compressor furnished by the bureau will be used to admit it to the suction side of the gas compressors being used for reservoir injection. For at least the initial phase, the Bureau of Mines will furnish a helium analyzer—costing around $1,400—with which trained operator can analyze from 30 to 50 gas samples during an 8-hour work day.

For the best results, it is obvious that helium should be injected continuously during the operation of the pilot program. However, due to the fact that the gas produced from the Hunton reservoir has a helium content of 0.05 per cent, this continuous injection would be too expensive. Hence, it is tentatively planned to add a concentration of 1 per cent helium for 1 week in each of the three pilot projects. The results of helium injection will be observed in one project before it is used in the other two. The effectiveness of the gas injection can be determined from the amount of gas injected before helium reaches offset wells and from the concentration of helium in the produced gas.

In addition this 1-week injection period, it may also be advantageous to introduce helium for a short period just prior to the end of the pilot injection program. The purpose of this move would be to ascertain how much of the injected gas is not being produced. Thus, some indication will be obtained of highly permeable areas in the reservoir where injected gas is being concentrated and not produced.

Well Testing Procedure

An extensive testing program will be carried out in conjunction with the gas injection to determine its effect on reservoir behavior. To obtain accurate measurements of oil, gas, and water production, each direct and diagonal offset to an input well will be provided with a separator, orifice meter (gas), stock tank or oil meter, and treater where necessary. Continuous daily gages will be made. Orifice meters will be installed on tank-battery vent lines at all batteries present on each 160 acres which adjoin a 160-acre tract that contains an input well. These production measurements will continue for 3 months after the gas injection ceases.

Bottom-hole static pressure readings will be taken immediately before injection in each input well and at the same time readings will be taken on direct and diagonal offsets to the input well. Thereafter readings will be taken at 30-day intervals during the gas injection, and for 3 months after it ceases.

Interference tests, of the "inverted" type, will be taken before gas injection is started and after the bottom-hole static pressure readings are made. In these tests, pressure-drawdown measurements will be taken in the input wells when offset wells are simultaneously put on production—after a shutdown period of 48 hours.

Productivity-index tests, in conjunction with pressure buildup tests, are scheduled to be made in offset wells, immediately prior to gas injection, within 1 month before the end of gas injection, and 3 months after gas injection ceases. P.I. tests may also be taken on each producing offset to injection wells as part of the regular monthly bottom-hole static pressure survey.

Profiling Instruments to Be Used

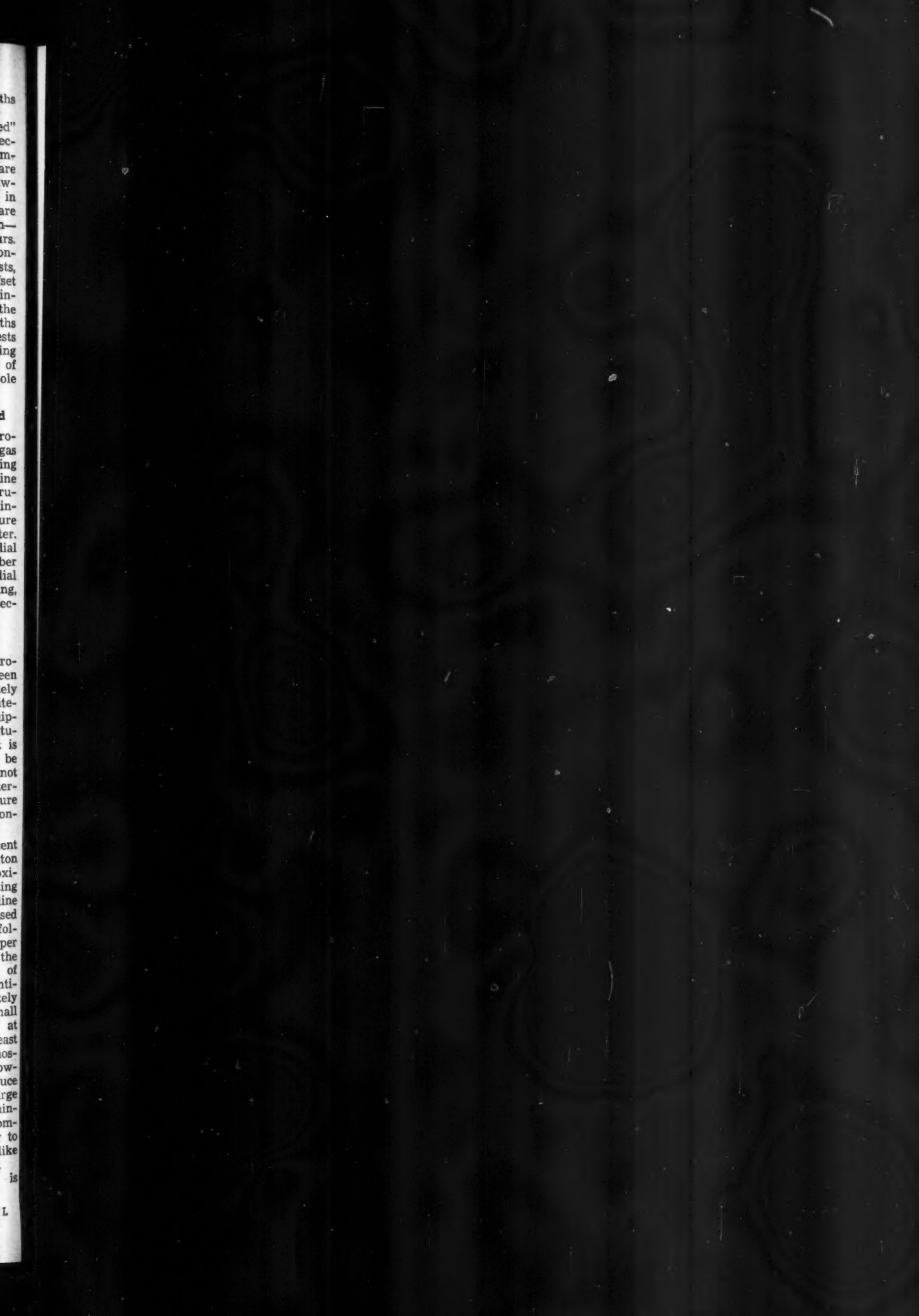
If, during the pilot injection program, it appears that serious gas channeling has developed, profiling instruments will be used to determine gas flow in the various zones. Instrument possibilities for this work include the spinner survey, temperature surveys, and the hot-wire flow meter. If the trouble zone is spotted, remedial work will be undertaken. A number of possibilities exist for remedial work including packers, acidizing, cementing, plastic, liners, and selective plugging agents.

110,000-M.f.c. Plant Proposed

As mentioned earlier, Sohio Petroleum Co. as unit operator has been authorized to proceed immediately with the design of a pressure-maintenance plant and purchase of equipment to return 110,000 M.c.f. of natural gas daily to the reservoir. It is hoped that sufficient results will be obtained from the pilot program not later than August 1, 1948, to determine whether the full-scale pressure plant and facilities should be constructed.

The proposed plant site is adjacent to the presently existing Hunton gasoline plant and will be approximately 6 miles west of the existing Continental-Phillips Edmond gasoline plant. Incoming gas for the proposed plant will be broken down as follows: (1) 36,667 M.c.f. residue gas per day at approximately 490 psi. from the Hunton plant; (2) 73,333 M.c.f. of residue gas per day from the Continental-Phillips plant at approximately 475 psi. In both cases the gas shall be dehydrated to a dew point at delivery pressure which is at least 10° F. below the prevailing atmospheric wet-bulb temperatures. However, it will not be required to reduce the dew point below 30° F. Discharge requirements for the pressure-maintenance plant are that it shall compress 55,000 M.c.f. of gas per day to a pressure of 1,000 psi. and a like amount to a pressure of 1,500 psi.

The pilot project committee is



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headed by Lincoln F. Elkins, Sohio Petroleum Co., and includes F. A. Lichtenheld, Cities Service Oil Co.; B. C. Barnes, Magnolia Petroleum Co.; David L. Dooley, Stanolind Oil & Gas Co.; Jack Tarner, Phillips Petroleum Co.; Lloyd L. Gray, Gulf Oil Corp.; George Folk, Anderson-Prichard Oil Co.; A. J. Holland, Fox & Fox, Inc.; Wesley W. Moore, British-American Oil Co.; and Thomas P. Harris, Mid-Continent Petroleum Corp.

West Edmond Hunton Lime Unit field personnel who will be directly responsible for carrying out the project include John Riise, superintendent; John Borror, chief engineer; Clifford Pratt, gas-injection engineer; John T. Cooke, reservoir engineer; and Ernest E. Dykes, gas foreman.

Corrosion Tests of Heater-Tube Materials

(Continued from page 137)

on the corrosion of Si Ni and silicon iron alloy was also investigated although not in the laboratory concentrator. Samples of Si Ni and Si Fe alloys were tested in 45 per cent and 55 per cent boiling H_2SO_4 both alone and coupled with carbon and graphite. Packs of carbon or graphite, lead, Si Ni alloy, and Si Fe alloy were also exposed to the acid.

Judging by the results of tests lasting 216 hours, the Si Ni alloy has a high rate of corrosion, 1.44 to 1.57 in. penetration per year in 55 per cent H_2SO_4 which, in these tests, was not appreciably affected by the presence or absence of carbon, graphite, lead, or combinations of these. The Si Fe alloy under similar conditions had rates of 0.025 in. per year coupled with carbon or graphite but a negligible rate in boiling 55 per cent acid alone.

There has been no logical explanation of the erratic corrosion of the silicon nickel alloy in 55 per cent H_2SO_4.

The relative positions of the various materials used and proposed for heating thimbles in acid concentrator service may be briefly summarized as follows:

1. Cast 12-14 per cent silicon iron alloy is probably the most resistant to corrosion in H_2SO_4 but has disadvantages of low impact strength and is difficult to obtain in sound castings of large size. Material is sensitive to thermal shock. Silicon impregnation of carbon steel appears to have possibilities if it can be demonstrated that satisfactorily uniform impregnation can be attained over large tubes.

2. Silicon nickel alloy has disadvantage of erratic and high corrosion rates at about 55 per cent concentration of hot H_2SO_4. Corrosion resistance appears excellent in other concentrations and strength and soundness of castings adequate. Some instances of breakage attributed to thermal shock and rough handling have been reported.

3. Iron molybdenum nickel alloy does not have sufficient corrosion resistance to warrant its use as concentrator thimbles although strength and ductility are good.

4. Glass-coated carbon steel heating thimbles on laboratory tests are indicated to have satisfactory resistance to 55 per cent and 70 per cent concentrations of hot H_2SO_4. However, the glass coating is fragile and will not withstand much thermal shock. Use of glass-coated thimbles would probably be most economical solution if technique of handling and maintaining them could be satisfactorily established. These limitations would also apply to glass-coated alloy tubes.

5. Silver or silver-coated tubes do not appear to have a satisfactory corrosion resistance in sulfuric acid when used to transmit heat to the acid.

6. Tantalum thimbles have shown surprising characteristics in plant tests although the tubes are fabricated of a thin sheet 0.012 in. thick. No laboratory tests have been run in the engineering laboratories of Standard Oil Development Co. on this material. Examination has been made of the test thimbles used in an acid concentrator in the field and no evidence of corrosion was found although the thin sheet was dented and scored. Tantalum tubes are operating satisfactorily in the first compartment of a reboiler at one of the refineries.

BOOKS

A HISTORY OF THE PETROLEUM ADMINISTRATION FOR WAR, 1941-1945. Prepared under the direction and editorship of John W. Frey and H. Chandler Ide. Published by the U. S. Government Printing Office, Washington. 463 pp. $3.

This record of the operations of the Petroleum Administration for War, and its predecessor agency, the Office of Petroleum Coordinator, covering the period from May 28, 1941, to May 8, 1946, is one of a series of histories of wartime government agencies, prepared in accordance with instructions by former President Franklin D. Roosevelt and President Harry S. Truman. The pages describe the evolution of the oil agency, itself, from a body with no powers and only a vague assignment as to functions, to its more clearly cut position as PAW, equipped with definite, if limited, authority, and its relationships with other government agencies. Also described is the evolution of the industry side of the partnership, beginning with the functional district committees, the first to be organized, and moving to the creation of the national body, the Petroleum Industry War Council, and the international group, the Foreign Operations Committee. Thereafter are recorded the manifold activities of the wartime operations of the oil partners which were required to supply petroleum products for the machines of war and a tremendously amplified home-front economy.

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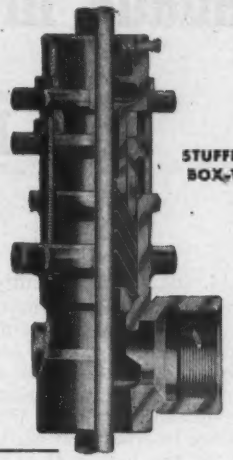

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Canada in Midst of Greatest Exploration Play in the Dominion's History

by Charles Deegan

IMPERIAL OIL, LTD., recently announced that it is planning to sell its common-stock holding in International Petroleum Co., Ltd., to obtain dollar exchange with which to carry out its plans for exploratory and development work in Western Canada. Since International has bright prospects for the long pull in South America, it was obvious to many oil men that Imperial believes it has even more promising prospects in Western Canada. Oil men familiar with the current situation there are in general agreement with this estimate, and, are acting upon it. Today the greatest leasing and exploration play in the dominion's history is gathering momentum.

In any modern large-scale exploration campaign, there are two aspects that are always considered by both management and the exploration executives in charge. First is the regional background, the over-all picture, of which any particular play or discovery is simply a small part. Second is the immediate "hot" area in the general vicinity of some important discovery that has triggered the rush into the area.

Obviously the more favorable the general regional picture, the more importance will be attached to any strike. When in addition, the strike is of major proportions, the interest becomes much more intense than when the new discovery is only of moderate or minor importance. A major strike in an extremely promising region has set off the present Canadian play.

Western Canada today is seen by those in charge of exploration campaigns as an area where both the regional background and the local hot area are on a scale so large as to be difficult to grasp by those not thoroughly familiar with conditions. Figs. 1 and 2 give a broad picture of the regional geology as it is known today.

Fig. 1—Map showing general features of western Canada. Main area described lies between front range of Rocky Mountains on west and dotted line marking depth to pre-Cambrian of 1,000 ft. on east. (Courtesy A.A.P.G.)

Size of Area Involved

Between the front range of the Rocky Mountains on the west, and the pre-Cambrian granite surface on the east, lies a belt of possible oil-bearing rocks. Along the United States' border, this belt is about 800 miles wide. Near the Fort Norman oil field, far to the north, it narrows to perhaps 150 miles, then broadens out to perhaps 300 miles or more along the Arctic Ocean. Its length is about 1,600 miles, north and south.

A total area of around 650,000 sq. miles is underlain by sedimentary rocks, largely of marine origin (favorable for oil accumulation), varying from 1,000 to 13,000 ft. in thickness. Assuming an average thickness of 1 mile, the region contains 650,000 cu. miles of potential oil-bearing sedimentary rocks.

This is equivalent roughly to a belt of land 400 miles wide, stretching from Washington, D. C., to Lake Tahoe, on the Nevada-California border.

What indications are there that oil accumulations may be found? Plenty. Consider them, from west to east. In the foothills belt, along the front range of the Rocky Mountains, in a thrust-fault region, there is Turner Valley, to date Canada's largest field, producing from Madison (Mississippian); accumulated production to January 1, 1948, about 93 million barrels, currently making 15,000 bbl. daily. In the middle, just south of Edmonton, the new strikes at Leduc and Woodbend, which may well be good for 100 million barrels ultimate production, from Devonian lime. East of Leduc, straddling the Alberta-Saskatchewan border is Lloydminster, a large area of Cretaceous sand; a

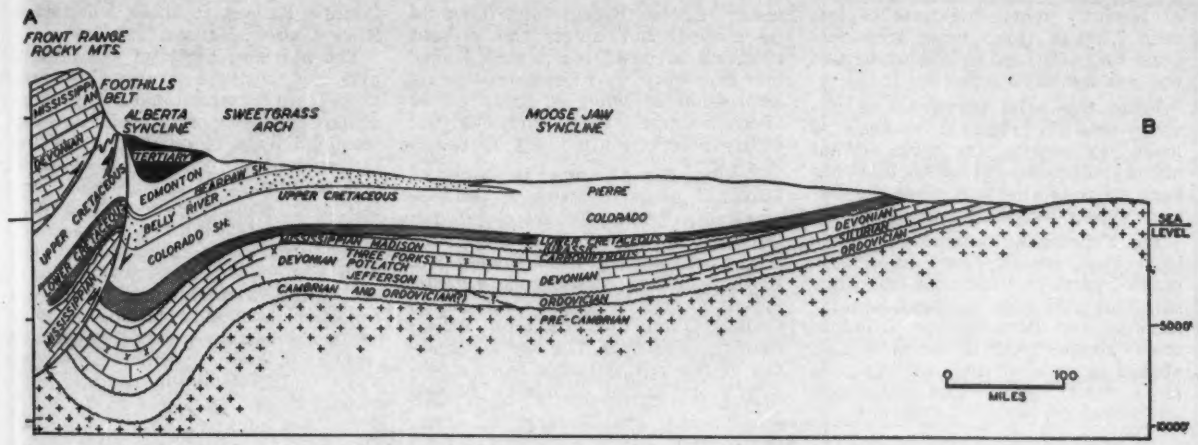

Fig. 2—Generalized structure section across southern plains region of western Canada. Location of section in Fig. 1. (Courtesy A.A.P.G.)

stratigraphic-trap accumulation of heavy oil, slowly coming into its own with about 4,000 bbl. daily production.

Perhaps most significant of all in terms of the possibility of finding large accumulations of oil are the Athabaska oil or tar sands. These lie about 250 miles northeast of Edmonton, up toward the pre-Cambrian surface granite shield. Here is the greatest accumulation of oil, or "near oil," known in the entire world. It is commercially unavailable at this time, because nature perhaps never quite got around to finishing the job. Here lie 100 to 500 billion barrels of oil or near oil in a basal Lower Cretaceous sand lying on top of the Devonian.

Many exploration scientists take the position that regardless of their present aspects, these Athabaska oil sands furnish ample evidence that whatever conditions it requires in nature to form oil, those conditions were present in this part of Canada in Lower Cretaceous time. Why should there not be more large Cretaceous sand, or Devonian lime accumulations in other places where nature had the time or found the right conditions to concentrate oil in the conventional manner?

From north to south, there are similar evidences of oil or gas in various places. But as of the moment, perhaps the most significant one is this. At Fort Norman an oil field produces from a Devonian reef. Some 900 miles south, at Leduc and Woodbend, one or perhaps two major oil fields have been found, producing from a Devonian reef.

Adding attractiveness to the regional background is the fact that generally speaking, deep drilling will not be necessary to test the major portion of the area. In Fig. 1 it will be noticed that the foothills belt is a relatively small proportion of the total area discussed. In this small section the drilling costs are admittedly high. But outside this small section, there are enormous stretches

Fig. 3—Illustrating area of "hot play" in Canada in terms of Oklahoma-Kansas

of territory where wildcats of less than 7,000 ft. (over large areas less than 5,000 ft.) are sufficient to test the sedimentary section.

From this brief survey, it is obvious that the regional background looks extremely favorable. What about the local hot area that has been accumulating ever since the discovery well was drilled in Leduc?

Fig. 3 shows the general area of the local play, superimposed on a base map of parts of Oklahoma and Kansas. This will give oil men familiar territory and distances from which to draw comparisons. It seem almost absurd to speak of such a large area as a "local play," and against a lesser regional background, it would be absurd. But unless the present situation is considered in such terms, one may very well get a misleading impression of what is going on in Western Canada today, and what the future prospects are likely to be.

Taking Fig. 3, and thinking of Canadian areas in terms of Oklahoma-Kansas points, the hot play today is equivalent to a belt or zone running from southeast to northwest. The south boundary of the zone extends approximately from Stillwater, Payne County, Oklahoma, to Miami, Ottawa County, Oklahoma. The north boundary of the belt stretches from somewhere north of Russell, Russell County, Kansas, to about Manhattan, Riley County, Kansas.

The northern limits of the present play are mostly determined by economic, rather than geological, conditions. The economic limits are determined by a blend of climate and the amount of general development and population of the area. Beyond this area, the population thins very rapidly; roads and general accessibility are much poorer. Most of the land has never been surveyed, and in addition there are different legal conditions affecting leasing activity beyond a certain point, because the regulations in effect there were drawn up with metal-mining conditions in mind.

The territory within the limits of the present play obviously offers plenty of work for a long time to come for many operators. This is true, even if the scale of exploration and development should double every year for several years to come.

In round figures, exploration men talk of 100 million acres in Alberta and 40 million acres in Saskatchewan as being in the play. Of this, perhaps 20 million acres has been optioned for exploration concessions, and as of early spring, a monthly turnover of 2 million acre per month was going on.

Simplicity of Options

Under Canadian laws, it is comparatively simple to get options on large tracts of land for exploration, only part of which can be retained permanently. The 2-million-acre turnover need add little or no net acreage under option; some is constantly being dropped, other acreage picked up; sometimes part of that dropped by one company is immediately picked up by another.

Among the companies taking part in this play, either directly or through Canadian subsidiaries or partners, are names familiar to oil men everywhere: Amerada Petroleum Corp.; Barnsdall Oil Co.; Continental Oil Co.; Gulf Oil Corp.; Husky Refining Co.; Pacific Western Oil Corp.; Phillips Petroleum Co.; Pure Oil Co.; Shell Oil Co., Inc.; Socony-Vacuum Oil Co., Inc.; Standard Oil Co. of California; Stanolind Oil & Gas Co.; Sun Oil Co.; Superior Oil Co. of California; and Union Oil Co. of California. Imperial Oil Co., which still dominates the field in Canada, is a subsidiary of Standard Oil Co. of New Jersey.

In Calgary, which is the main headquarters city, a recent check, undoubtedly out of date by now, showed that over 90 members of the Alberta Society of Petroleum Geologists were headquartering in Calgary, and that the total membership was well over 100. It is interesting to note that by comparison, the 1947 membership list of the American Association of Petroleum Geologists showed only 68 members in all of Canada.

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A combination that protects head, face and eyes. Face shield folds back when not in use. Standard size 6" long — also available in 8" and 9" lengths. Comes in clear or green cellulose acetate, .040 gauge. "T" hat is made of duraluminum — extra strong — extra light — extra safe.

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for oil field derrick men

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are operating in the area of hot play could hardly be estimated with any degree of accuracy, unless a specific date were added as a qualifying clause. New parties are arriving weekly, and they are spread out over a large territory. Since both the Leduc and Woodbend discoveries are reported to have been on seismograph results seismic parties are swarming throughout the area.

Drilling Stepping Up

Drilling activity is of course stepping up in proportion to the other phases of the campaign. Development and extension work at Leduc and Woodbend account for about half of the 75 to 80 active rigs in the Province of Alberta (not including the Alberta portion of the Lloydminster field). Imperial, which is of course the pace setter, recently announced that it would turn over all of its development drilling, and stepout work in semiproven areas, to contractors. All company rigs will be kept busy on the strictly wildcat locations the company has lined up. At the time of this announcement, the company had 16 contract rigs on development drilling work.

The total footage drilled in Alberta last year was more than double that of 1946, but indications are that 1948 may do considerably better than double the 1947 record, unless pipe shortages get even more drastic than they are at present. In terms of total footage, the 1947 Alberta record, as reported by the Petroleum and Natural Gas Conservation Board, equaled about three-fourths as much as the State of Wyoming. The present outlook is that Alberta's footage will pass Wyoming this year, even though Wyoming operators scheduled programs call for a 50 per cent increase over last year.

Unless the geologists, geophysicists, and top executives of many companies are completely wrong, 1948 will be only the beginning of a development in Western Canada that will dwarf all past records. In the announcement of Imperial's intent to dispose of its International Petroleum holding, President Henry H. Hewetson said that Imperial's exploration and development program in Western Canada had reached a stage where its future promised to be of major importance to Canada. From the list of companies moving into the play, it is obvious that he is not alone in holding that opinion about the long-term prospects.

Firm Name Changed

The name of The American Rolling Mill Co. was officially changed to Armco Steel Corp. at the annual meeting of stockholders April 15, Charles R. Hook, president, has announced. The change became effective April 17.

WANTED

REFINERY SUPERINTENDENT

Excellent Opportunity

Here is a "once in a lifetime" opportunity for young, experienced refinery superintendent who can go places with this fast moving, progressive organization. If you have the experience, background and ability to step into this opening, write us in complete detail. Tell us all about yourself. State age. Salary is open. Write Fred O. Case, Refinery Manager, Great Lakes Refining Company, Division of Petco Corporation, P. O. Box 145, Blue Island, Ill.

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CRUDE OIL PROCUREMENT EXECUTIVE

TO HEAD PURCHASING DEPARTMENT OF LARGE INDEPENDENT, INTEGRATED OIL COMPANY

Salary is in the "upper income brackets" and the executive we seek must be of this calibre. Major oil company experience is helpful but not essential. Please write, giving complete details regarding experience and background.

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*BONUS: "Something given in addition to what is usual or strictly due."—Webster

BUILT AND WARRANTED FOR UP TO 37,000 LBS. GROSS

NEW HIGHER RATINGS!
Gross Train Weight up 48%
Gross Vehicle Weight up 42%
Truck Body and Payload up 39%.

Series	Gross Train Weight	Gross Vehicle Weight	Truck Body and Payload
F-7	32,500 lbs.	19,000 lbs.	12,500 lbs.
F-8	37,000 lbs.	21,500 lbs.	14,200 lbs.

145 HORSEPOWER V-8 TRUCK ENGINE!

45% more horsepower than "239" V-8! 337 cu. in. displacement. 255 lbs-ft. torque at 1800 r.p.m.

UP TO 10.00-20 TIRES!
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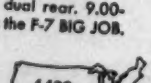

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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

Relation of 26-70 to AA Grade Gasoline

What is the relationship between the old AA grade natural gasoline and the 26-70 grade now used? Are they the same?—F. C. E.

The old natural-gasoline grading system as used in 1931 was based primarily on percentage recovery:

	Per cent recovery	A.P.I.
A	over 90	72-79.9
AA	over 90	80-87.9
B	85-90	76-84.9
BB	85-90	84-92.0
C	78-85	80-90.0

The first gasolines produced by the natural-gasoline industry were poorly fractionated and hence the loss was great and many gasolines tended to fall in the C grade. With constant improvements in gasoline-plant technology, the B and A grades become more and more common. By 1929 scarcely any gasoline except AA grade was being marketed because nearly all plants had been modernized with respect to degree of fractionation. In addition there was a natural tendency to produce AA rather than A and BB rather than B grades because the yields are greater with the high-gravity grades. The Natural Gasoline Association of America subcommittee on specifications conducted a survey in 1930 and found the distribution of grades in 2,937,500 gal. was:

AA	66.8
A	2.2
BB	27.0
B	1.2
C	2.8
Total	100.0

and:

Grade—	Per cent
34-55	0.88
34-70	2.66
30-40	0.33
30-55	4.76
30-70	22.60
26-25	0.17
26-40	0.91
26-55	12.60
26-70	41.60
22-25	0.21
22-40	1.44
22-55	7.53
22-70	3.04
18-25	0.20
18-40	0.53
18-55	0.06
14-40	0.48
Total	100.00

From this survey they most generally suggest the following equivalency:

AA	26-70
A	22-40
BB	30-70
B	26-40
C	34-70

Obviously, there is no exact relation between the old and new grades. For example, the property ranges of AA and 26-70 are somewhat as follows:

	AA grade	26-70 grade
Recovery, per cent	90 plus	high
A.P.I.	80-87.9	86-92
Per cent at 140° F.	46-83	70-85
Per cent at 100° F.	2-54	38-60
Per cent butanes and lighter	0-41	20-34
Pentane ratio	22-84	44-64

Nevertheless, the predominant old grade in 1931 was AA and the predominant new grade in 1932 was 26-70. Since that time the equivalent of the C, BB, and B grades have been marketed scarcely at all, and the proportion of 26-70 grade may have dwindled slightly because of the increased manufacture of butanes for bottle gas and chemical manufacture. However, much of the extra butanes now being manufactured has been produced by the extraction of larger amounts of butanes from the gas. Statistics of production, market prices, and the basis of gasoline-plant design, continues to be 26-70 grade natural gasoline.

Distillation Curves of Cracked Residuum

What is the boiling range of cracked residuum?—F. E. C.

Little is available about the boiling ranges of high boiling stocks, even lubricating oils. Perhaps the best organization of boiling point as related to other properties is the characterization factor relationship introduced by Egloff, Nelson, and Watson (*The Modern Cracking Process, The Oil and Gas Journal, July 2, 1936, page 34,* or Petroleum Refinery Engineering, second edition, page 103, McGraw-Hill Book Co., Inc., New York, 1941). The characterization factors of cracked residuum generally range from 10 to 11, and the gravities from 3° to 10° A.P.I. When using these ranges, the average molal boiling points are somewhat as shown in Table 1.

The only distillation data readily at hand are those of H. C. Schutt (U. S. Patent 2,101,800, December 7, 1937) shown in Table 2.

Most cracking-plant residuums fall between the somewhat extreme materials shown in Table 2. Note that the computed characterization factors of Table 2 check with the data of Table 1 with reasonable accuracy.

TABLE 1—APPROXIMATE AVERAGE MOLAL BOILING POINTS OF CRACKED RESIDUUMS

A.P.I. gravity	Molal average boiling points (°F.) for these types of stocks					
	10 C.F.	10.2 C.F.	10.4 C.F.	10.6 C.F.	10.8 C.F.	11 C.F.
3	705	790	855	930	1,015	....
4	680	750	825	900	980	....
5	655	725	795	873	953	1,030
6	630	700	770	845	925	985
7	605	675	743	815	895	960
8	580	650	717	790	865	930
9	560	630	690	760	835	905
10	540	605	670	735	810	885
12	500	560	620	685	755	820

TABLE 2—CHARACTERISTICS OF CRACKED RESIDUUMS

	Viscosity breaking residuum		Vapor phase residuum	
H/C ratio	1.7		0.95	
Gravity, A.P.I.	8.8		8.8	
Viscosity, S. Furol at 122° F.	1,029		15	
B.s. and w.	0.2		0.4	
Boiling range*	4 mm.	760 mm*	4 mm.	760 mm.*
I.b.p., °F.	170	430	140	395
5 per cent	285	575	180	442
10	377	685	214	485
20	...	...	248	525
30	578	918	308	603
40	...	...	352	658
50	632	980	396	712
60	...	...	444	762
70	...	...	494	823
80	...	...	574	915
Characterization factor (approx.)	11.1		10.4	

*Distillations conducted at 4 mm. pressure.

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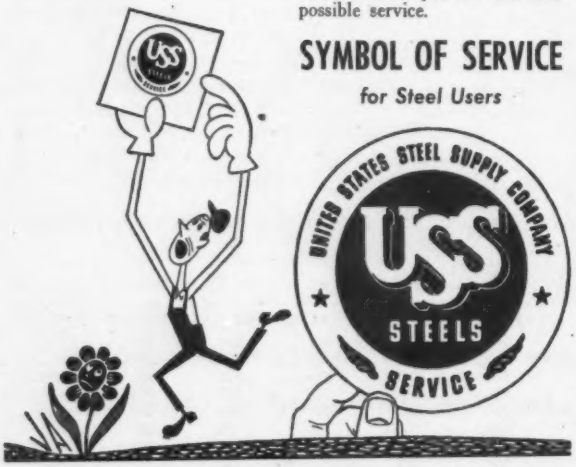

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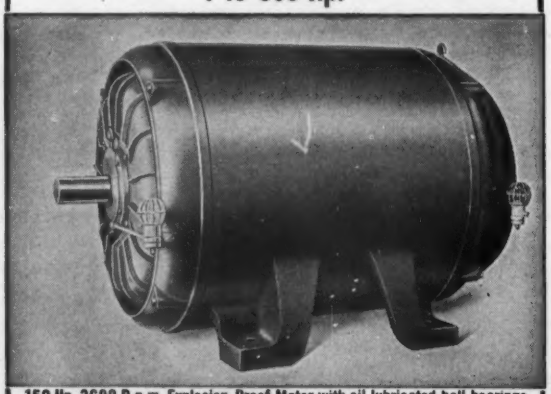
All mineral and royalty interests owned by this Bank, consisting of approximately 75,000 royalty acres located in the states of Texas and Oklahoma, will be offered for sale at public auction at the quarters of the Bank, 1042 Milam Building, San Antonio, Texas, at 10 A.M., on June 1, 1948.

Full information regarding these assets will be available at the quarters of the Bank until May 31, 1948. All details of the auction, including printed description of the assets, will be mailed upon request.

Assets are offered in BULK ONLY. All bids must be for entire portfolio.

THE SAN ANTONIO JOINT STOCK LAND BANK of San Antonio

Continental
EXPLOSION-PROOF MOTORS
1 to 600 Hp.



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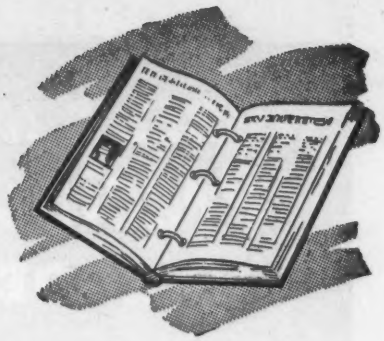
The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Pressure-Temperature Ratings

Schedule 80 (Extra-Heavy*) Pipe

THE allowable pressures tabulated here are based on Code for Pressure Piping (Section 3) of A.S.A. B31, as explained in The Refiner's Notebook No. 191 of April 8, 1948. The small figure on this page indicates factors for the effect of Temperature. It applies only to Section 3 (Oil-Refinery and Gasoline-Plant Piping)

It must be noted that the allowable pressures tabulated here do not apply to power-plant piping (Section 1), gas and air piping in cities, pipe lines, etc. (Section 2), or for steam piping outside the power plant (Section 4).

Pressures about 28 per cent higher can be permitted if Grade B rather than Grade A seamless pipe is employed.

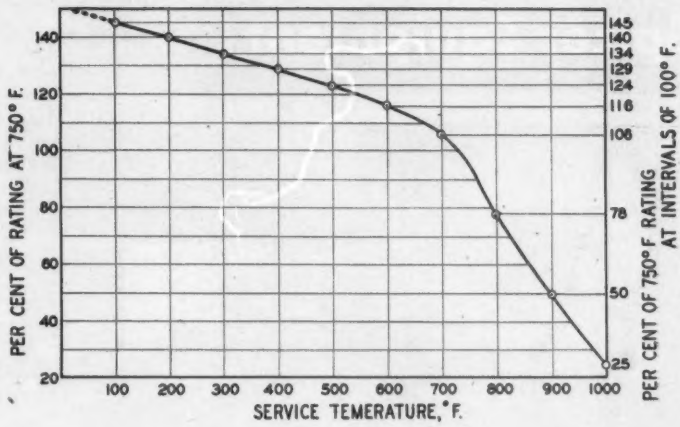


TABLE 1—ALLOWABLE PRESSURE IN OIL-REFINERY AND NATURAL-GASOLINE-PLANT PIPING

Nominal pipe size (in.)	Outside refinery limits 100° F.	Maximum allowable working pressure, psi. 100° F.	300° F.	500° F.	700° F.	750° F.	800° F.	900° F.	1,000° F.
			Screwed Joints†						
⅛	6,420	4,650	4,300	3,980	3,410	3,210	2,500	1,605	802
¼	5,340	3,870	3,580	3,310	2,830	2,670	2,080	1,335	667
⅜	4,680	3,390	3,140	2,900	2,480	2,340	1,820	1,170	585
½	4,100	2,970	2,750	2,540	2,170	2,050	1,600	1,025	512
¾	3,560	2,580	2,390	2,210	1,890	1,780	1,390	890	445
1	3,160	2,290	2,120	1,960	1,675	1,580	1,230	790	395
1¼	2,800	2,030	1,875	1,735	1,485	1,400	1,090	545	350
1½	2,650	1,920	1,775	1,640	1,405	1,325	1,030	515	331
2	2,450	1,775	1,640	1,520	1,300	1,225	955	477	306
			Welded Joints‡						
3	2,950	2,100	1,950	1,790	1,585	1,455	1,210	725	360
3½	2,780	1,980	1,835	1,675	1,490	1,370	1,135	685	340
4	2,650	1,890	1,750	1,605	1,420	1,305	1,080	650	325
5	2,440	1,740	1,610	1,475	1,310	1,200	995	600	300
6	2,400	1,720	1,590	1,460	1,290	1,185	980	590	295
8	2,200	1,560	1,445	1,330	1,180	1,080	895	540	270
*10	2,320	1,510	1,395	1,280	1,130	1,040(865)*	860	520	260
*12	2,090	1,490	1,380	1,265	1,120	1,030(730)*	850	515	258
*14 o.d.	2,100	1,500	1,390	1,270	1,130	1,035(665)*	855	515	259
*16 o.d.	2,080	1,485	1,370	1,260	1,115	1,025(581)*	850	510	256
*18 o.d.	2,070	1,480	1,365	1,255	1,110	1,020(517)*	845	510	255
*20 o.d.	2,070	1,480	1,365	1,255	1,110	1,020(465)*	845	510	255
*24 o.d.	2,050	1,460	1,350	1,240	1,100	1,010(388)*	835	505	252

*Extra-heavy pipe is thinner than Schedule 80 pipe at diameters larger than 10 in. See 750° F. column for representative working pressures of extra-heavy pipe. †Values of C—⅛-in. 0.03, ¼-⅜-in. 0.044, ½-¾-in. 0.057, 1-2-in. 0.07. ‡Values of C for welded joints, 0.05.

No. 194 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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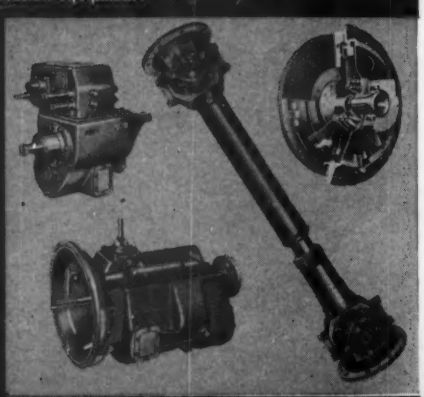
This giant mirror will enable man to extend his vision into the heavens to a range of one billion light years; a distance so great that the human mind cannot comprehend or understand it.

The Belyea Truck Co. used Sterling Trucks with 150 hp. Cummins Diesel engines, Spicer Brown-Lipe Transmissions, Spicer Auxiliary Transmissions, Spicer Propeller Shafts and Universal Joints, and Spicer Clutches to haul the 15-ton mirror to the top of Palomar Mountain. The 130-mile trip from Pasadena was made without mishap, four hours ahead of schedule—another precious cargo safely delivered by Spicer power transmission equipment!

The giant mirror safely delivered to the observatory after the long 130-mile haul, and being carefully unpacked.

The beautiful Dome Building which houses the precious 200" diameter mirror at the Palomar Mountain observatory in San Diego County.



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PIPE LINES

First Reading Given Western Pipe Lines Bill

OTTAWA, Canada.—First reading has been given by the Dominion senate to a bill incorporating Western Pipe Lines, Ltd., with head office at Winnipeg and capitalization of 2,500,000 no par shares.

The company plans the construction of a transmission line to deliver natural gas from Alberta fields to Winnipeg, serving communities along the route in Alberta, Saskatchewan, and Manitoba.

The bill empowers the company to acquire and distribute natural gas, own, construct, maintain, and operate pipe lines, reservoir and plant equipment, and buy or lease pipe-line systems.

Sponsors of the company are L. D. M. Baxter, Edward A. Nanton, David A. B. Murray, Gordon P. Osler, and Harold G. Tucker, all of Winnipeg.

Sinclair Plans 2,124-Mile Products Line Program

For Sinclair Refining Co.'s products pipe-line system, a program is now being undertaken and planned for the future involving a total of 2,124 miles of pipe, including new lines and reconditioning work.

Lines totaling 441 miles now under construction which are scheduled for completion June 1 comprise two projects: (1) Houston - Fort Worth, Tex., 264 miles, 10-in., contracted by H. C. Price Co.; (2) Fort Worth-Panova, Okla., station, 177 miles of 8-in., contracted by Pacific Pipe Line & Engineers, Ltd.

Reconditioning projects totaling 580 miles now under way, contracted by Pacific Pipe Line & Engineers, Ltd., are as follows: Panova-Redel station, 290 miles, 8-in., to be completed May 15; Redel-Wood River, Ill., 270 miles 8-in., to be completed July 30; Redel-Kansas City, Mo., 20 miles, 6-in., to be completed May 25.

Products projects planned for the future by Sinclair total 1,103 miles of 8-in., include: Marcus Hook - Philadelphia, 26 miles; Carrollton, Mo.-East Chicago, Ill., 387 miles; and Sinclair, Wyo. - Kansas City, Mo., 700 miles.

The 387-mile, 8-in. East Chicago-Carrollton, Mo., section of the Sinclair products system will have five pump stations to move 23,000 bbl. daily, serving Chicago Heights, Streator, Joliet, Kankakee, and Galesburg, Ill.; Fort Madison, Iowa; and Kirksville, Mo.

Operations Begun At Ingleside Terminal

Operation of Sun Pipe Line Co.'s (Texas) new deep-water terminal at Ingleside, Tex., began early this week. The SS Sabine Sun took aboard the first cargo from the 1,000,000-bbl. storage tank farm which forms the northern extremity of a gathering and trunk system extending from Sun field in Starr County, Texas, near the Mexican border, to the new terminal.

Boom tractors handling section of 28-in. pipe in the laying of a river crossing in connection with the looping program of Tennessee Gas Transmission Co.

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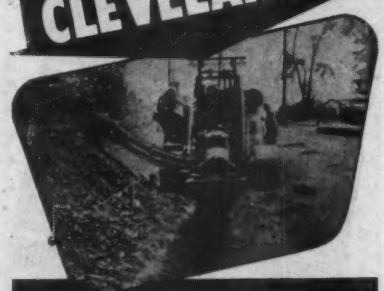

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THESE ARE THE
Men Behind the Job
who get the Job Done

Paul Halbert, in charge of all construction work, is known as a mechanical expert. He has probably done more to develop special equipment used in pipelining than any other man. Many modern methods and pieces of equipment now in use can be traced to Halbert. It's men like Halbert who keep pipelining at its best!

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The Oldest Pipe Line Contracting Company in the Business... Specializing in Oil, Gas and Gasoline Pipe Lines for Over 30 Years

OKLAHOMA
CONTRACTING CO., Inc.
MERCANTILE BANK BLDG.
DALLAS 1, TEXAS

The terminal completes a crude-oil pipe-line system begun in 1946 and provides a new tidewater outlet for crude oil destined for eastern shipment. The trunk system includes 244 miles of pipe lines, ranging in size from 4 to 10-in. pipe, and links the new terminal with 23 oil fields.

Built on a 200-acre tract of land on the northeast side of Corpus Christi Bay, the terminal includes seven 131,000-bbl. capacity steel storage tanks from which crude can be pumped aboard tankers at a rate up to 20,000 bbl. an hour. Gravity loadings can be accomplished at the rate of 7,000 bbl. an hour.

Operations at Ingleside will be under the direction of F. Hill Sanders, vice president and general manager of Sun Pipe Line Co. (Texas). J. T. Butterfield, Southwest Texas district superintendent, will be in charge of actual field operations.

Southern Natural and Atlantic Hearings Set

Amended applications by Southern Natural Gas Co. and Atlantic Gulf Gas Co. have been consolidated by the Federal Power Commission for a hearing set for June 14.

Southern Natural requests authorization to construct and operate a 24-in., 375-mile pipe line from Gwinville field in Mississippi to Atlanta, Ga., with extensions; a 16-in. trunk line extending about 225 miles from a point on the proposed 24-in. Gwinville-Atlanta line to the vicinity of Colfax, Ga., with several extensions; and compressor stations with a total of 31,600 hp. to be located on the trunk and extension lines. Cost has been estimated at $43,625,895.

Atlantic Gulf Gas Co. seeks authorization for construction and operation of approximately 1,530 miles of natural-gas transmission lines.

Aluminum Alloy Used in Crude-Oil Pipe Line

The normal composition of 63S-T6 alloys is: magnesium, 0.7 per cent; silicon, 0.4 per cent; the balance of 98.9 per cent is made up of aluminum and normal impurities. This is the composition of the aluminum alloy utilized in making pipe for sections of crude-oil pipe line described in an article entitled. "Interstate Lays First Experimental Section of Welded Aluminum Pipe Line" starting on page 141 of this issue. The normal composition of 63S-T6 alloy is presented here to serve as a correction of data appearing at the top of page 142. Information regarding the laying of aluminum pipe for this pioneer project was obtained by the author during 2 days' observation of work on the first section of aluminum pipe line, while it was being welded and tested.

LARGEST PIG CLEANS CRUDE OIL PIPE LINES

This 26" Williamson Type "RC" Pig is typical of the larger sizes which we build to customer specifications for cleaning-batching-line displacing-plugging operations.
Aluminum flanges minimize weight and "jet rotation" feature* distributes wear of brushes and cups.
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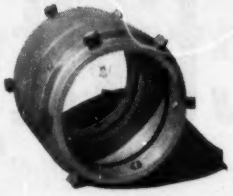

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For BETTER cleaning of
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PRODUCT LINES
NATURAL GAS LINES

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Pipeline Cleaners Co.
Fort Madison, Iowa

118 Miles Now Under Way by Chicago Line

Natural Gas Pipeline Co. of America and Texoma Natural Gas Co. are planning the construction of 118 miles of 24-in. and 26-in. pipe line the balance of this year. Already 17 miles of line have been laid, making the total 1948 program 135 miles.

Projects now under way consist of the following: 36.8 miles of 26-in. contracted by R. H. Fulton & Co. for completion August 1, from Hooker, Okla., to the companies' main line; 27.4 miles of 26-in., contracted by Midwestern Constructors for completion November 1, main-line looping in Iowa and Illinois; 53:9 miles of 24-in. contracted by H. C. Price Co., for completion November 1, main-line looping in Illinois.

During the first quarter of this year R. H. Fulton & Co. completed 17 miles of 16-in. and 26-in. for Texoma's gathering system and for main-line looping in Texas.

Socony-Vacuum Plans New York Products Extension

Socony-Vacuum Oil Co., Inc., plans to begin construction in about 3 weeks on a 154-mile, 8-in. pipe line from Binghampton, N. Y., to Malvern, Pa.

The line will have an additional 57 miles of spurs at Reading, Allentown, Exeter, and Hazelton, Pa.

The line will complete a continuous system with the Paulsboro, N. J. Midland, Pa., line connecting Syracuse, Buffalo, and Rochester, N. Y.

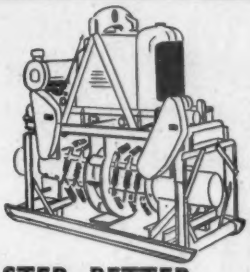
Cities Service Awards Contracts for 233 Miles

Cities Service Gas Co. awarded contracts last week for laying 233 miles of pipe for the new trunk line from Hugoton field to Kansas City.

Ray L. Smith & Son, Inc., has contract for laying 183 miles of 26-in. from Ulysses, Grant County, Kansas, to Hutchinson, Kans.

Midwestern Constructors, Inc., started laying pipe early this week for a 50-mile section of the project consisting of 48 miles of 26-in. and 2 miles of 24-in. This section extends from Ottawa, Kans., to Glavin Junction, in the Olathe area, and thence 10 miles east to a point across the Missouri boundary. Midwestern has a field office at Olathe for operations supervised by M. T. (Bill) Wilhite, superintendent.

The Cities Service construction organization has recently been engaged in two projects. During the first part of this year it laid the Columbus-Pittsburg, Kans., 15-mile 12-in., to replace 10-in. It is now laying the Liberty, Kans.-Carthage, Mo., 47 miles of 20-in. to replace 16-in.



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Among the

Drilling Contractors

Commonwealth Drilling Co. of Calgary recently spudded Co-Op Leduc 1, LSD 13, 35-50-26w4, in Leduc field for the Saskatchewan Federated Co-Operatives, Ltd., of Regina.

L. E. Reames Drilling Co., Oklahoma City, is developing Bartlesville sand production in the old Hogshooter field, Washington County, Oklahoma. Company has drilled 1 Carl Greenwood, SE SE SE 5-25n-14e, and bailed 30 bbl. daily from 1,032-61 ft.

I. G. Watkins Drilling Co., Fairfield, Ill., has received permit to drill its 1 Harve Miller, 330 ft. from north and east lines, SW SE 19-1s-18e, Wayne County, Illinois.

Acme Drilling Co. is the contractor for the H. I. Pope & Associates 1 Gibson, in California's Huntington Beach townlot field.

Devon Drilling Co. has been incorporated under Alberta charter with head office at Wetaskiwin, Alta.

Fleet Drilling Co., Ada, Okla., is starting a wildcat for Sinclair Prairie Oil Co. and Mid-Continent Petroleum Corp. in Stephens County, Oklahoma, the 1 Duncan Lake, SW SW SW 26-1-6w. Contract depth is 6,500 ft. and location is result of seismograph work.

Shaw Petroleums, of Lloydminster have a contract with A. E. De Palma and associates of Toronto to drill two wells in the Blackfoot section of Canada's Lloydminster field.

Brown Drilling Co. will drill a test for Standard Oil Co. of California in Huntington Beach field. The well is the 5 Surf One.

George & Wrather Drilling Co. is drilling a 2,900-ft. test with company tools, its 1 W. A. Wilson et al, 330 ft. from south and east lines, SE NW SE 34-5s-13w, Posey County, Indiana.

Farney Exploration Co. has been organized with head office at Calgary by H. L. Farney, formerly with Heiland Exploration Co., and will carry on seismic work in Alberta.

Nicklos Drilling Co., Houston, has contracted with Gulf Oil Corp. for a 12,000-ft. wildcat in Brazoria County, Texas, on the Upper Gulf Coast. The well is Gulf 1 S. S. Perry, in Stephen F. Austin 7⅛ League, Abstract 20, about 7 miles southeast of Brazoria. Nicklos was rigging up for the test this week.

Crew of Creekmore Drilling Co., drilling the Amerada Petroleum Corp. 10 Hanson, in Stephens County, Okla. The men are: C. E. Johnson, tool pusher; R. Bailey, driller; Darrel Dodson, backup man; Bill Lacy, derrick man; A. O. Johnson, motorman; Roy E. Goodman, floorman

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For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

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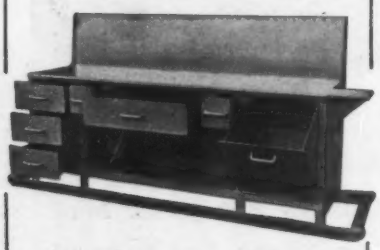

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Al Buchanan Drilling Co. San Antonio

Growth.—Al Buchanan, president of the drilling firm bearing his name, this year rounds out his fortieth year in the drilling business. Beginning as a roughneck at Petrolia, Tex., in 1908, he followed the booms through North Texas and elsewhere until in 1919 he entered into contracting with Hal Hughes in Burkburnett; assets, one rotary rig.

AL BUCHANAN

Hughes and Buchanan continued as a partnership until Buchanan bought full interest in 1923 and organized Al Buchanan Drilling Co. Active in Huntington Beach, Mexia, Smackover, and other booms of that period, he came to South Texas to stay when the Luling-Darst Creek-Salt Flat discoveries developed. Since then he has drilled more than 2,000 wells in South Texas, nearly 100 of them on one lease alone in Seeligson field in Jim Wells County. During that period his rigs have also drilled in California, West Texas, Colorado, Arkansas, Mississippi, Louisiana, and Florida.

Buchanan rigs have opened up several fields, most of them in South Texas. In several he has had partial or full operating interest.

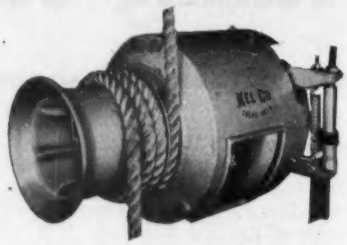
They operate at present seven steam rigs and three power rigs. Production, wholly owned, or held in partnership with Blanco Oil Co., is located in Jim Wells, Calhoun, Duval, Webb, and Wichita counties, Texas.

Personnel.—Present officers include Al Buchanan, president and treasurer; Frank Buchanan, vice president and general superintendent of drilling operations; Irene Slattery, secretary; R. O. Van Fleet, general superintendent of production, and Thomas S. West, geologist. Tool pushers include: Clyde Buchanan, R. B. Cassidy, C. O. West, E. A. Walton, I. H. Millican, and S. R. Boles.

Sidelights.—Buchanan early conducted offshore drilling operations in the Corpus Christi district; Flour Bluff, White Point and Nueces Bay. His most ambitious operation of that type was a wildcat for Humble Oil & Refining Co., located 2 miles off the Florida coast at Barnes Sound.

KELCO MODEL 16

NON-FOULING CATHEAD



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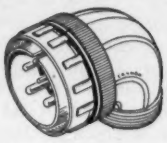
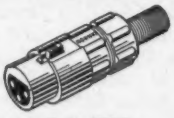


Type "AN"

Type "X"



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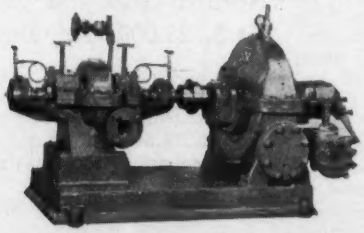

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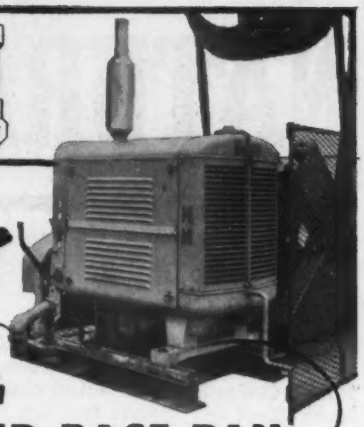

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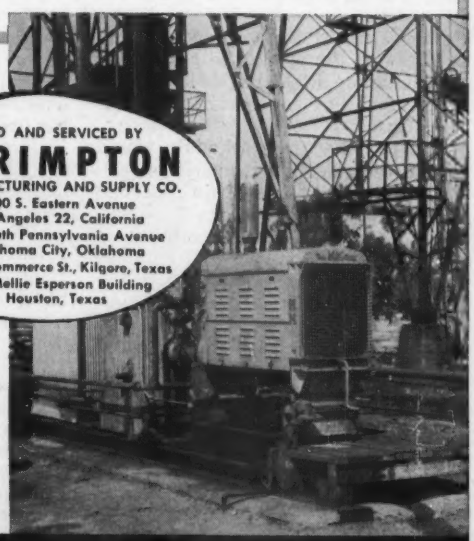
Plan to see the new Minneapolis-Moline OILFIELD POWER UNITS on display at the IPE in the Scientific and Technical Bldg.



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NATURAL GAS

Memphis Natural Seeks Increased Capacity

Memphis Natural Gas Co., Memphis, Tenn., has requested Federal Power Commission for authorization to construct and operate facilities estimated at $843,493. The facilities would increase the system's capacity to approximately 200,000,000 cu ft. daily.

Proposed facilities include 1,200-hp. compressor units at the company's Lula and Benoit, Miss., compressor stations, and one at the Wilmot, Ark., compressor station; two 1,000-hp. compressor units and housing at the inlet of its 20-in. Lisbon pipe line in Claiborne Parish, Louisiana, and 9,000 ft. of 18-in. pipe to extend both ends of its 14-in. Mississippi River crossing at Greenville, Miss.

Installation and construction will begin as soon as authority is granted by FPC, the company said.

FPC Suspends Panhandle's Ohio Fuel Rate Schedule

Suspension of Panhandle Eastern Pipe Line Co.'s rate schedule supplement reducing the quantity of gas deliveries to Ohio Fuel Gas Co. has been directed by the Federal Power Commission. FPC also reopened proceedings on the authorization granted to Panhandle in March 1945 to construct facilities for service to Ohio Fuel Gas.

The proposed rate schedule would reduce the effective schedule providing for deliveries to Ohio Fuel up to 50,000,000 cu. ft. daily to 25,000,000 cu. ft. daily, beginning April 16.

The authorization of March 1945 was issued to Panhandle upon the condition that Panhandle not abandon or terminate any service rendered to Ohio Fuel by means of the authorized facilities without first obtaining approval of the commission.

T.G.T. Asks Immediate FPC Action on Program

HOUSTON.—Tennessee Gas Transmission Co. has asked the Federal Power Commission to hasten action on part of its proposed expansion program which includes the laying of a new natural-gas line from eastern Kentucky to Buffalo, N. Y.

T.G.T.'s full program provides for the construction of a line to near Boston. In asking an immediate hearing on that part for a line extending as far as Buffalo, the company said it is in the public interest to meet the emergency needs of these areas before seeking new markets, but emphasized it is not in any manner abandoning its proposal to serve eastern New York state and New England.

T.G.T.'s new application would allow improvements raising system throughput from its presently authorized capacity of about 660,000,000 cu. ft. daily to 1,000,000,000 cu. ft. daily. Included are plans for laying 1,461 miles of new line and addition of 91,200 hp. in compressor stations.

The pipe to be laid includes 992 miles of loop line, mostly 30-in., from South Texas to West Virginia, 395 miles of 26-in. from Kentucky to near Buffalo; 44 miles of 16-in. from Columbiana County, Ohio, to a point in Allegheny County, Pennsylvania, and 30 miles of 16-in. gathering lines in the Southwest.

T.G.T. said it has sales contracts for substantially the full capacity of the proposed new system.

FPC Proposes Gas Rate Schedule Change

Notice of proposed modifications, the principal purpose of which is to require gas company rate schedules to be filed in the form of tariffs instead of the special, individually executed contracts permitted under the present rules, has been sent by the Federal Power Commission to all natural-gas companies and state regulatory commissions. Comments on the proposed rule amendments have been requested not later than May 14.

The amendments propose a number of other changes for simplification of filing procedure, and allow informal submission of rate schedules prior to filing.

Additional revisions would include elimination of a certificate of concurrence as an alternative to the filing of rate schedules, exemption of export and import contracts from the requirement of filing in tariff form, elimination of some requirements for filing of contracts for direct sales to government agencies, and reduction to 100,000 cu. ft. a day for the exemption relating to filing of direct industrial contracts by natural-gas companies.

Copies of the notice may be obtained from the Division of Publications, Federal Power Commission, Washington 25, D. C.

Chicago District Seeks Calumet Line Looping

Chicago District Pipeline Co., Joliet, Ill., has requested authorization from the Federal Power Commission to loop its Calumet Line, which extends from the vicinity of Joliet to the southern limits of Chicago. Cost of the project is estimated at $4,000,000.

The proposed facilities include approximately 41 miles of 24-in. line, starting at a point in Joliet Township in Will County, Illinois, and extending through Chicago Heights to a point on the south city limits of Chicago. Also 11 valve connections would be installed, 20 railroad crossings, 3 water crossings, 1 tunnel under Grand Calumet River, and 53 highway crossings. Peoples Gas Light & Coke Co. would loop the 7-mile section of the Calumet Line extending from Chicago's city limits to their Calumet Gas Plant.

Completion of the proposed facilities is expected by 1952.

Natural Gasoline

Humble to Build Gasoline Plant Near Opelousas

HOUSTON.—Humble Oil & Refining Co. is planning to construct an absorption-type gasoline plant south of Opelousas in St. Landry Parish, Louisiana, which will process wet gas passing through Interstate Gas Co.'s pipe line.

The plant will have a capacity of about 100,000,000 cu. ft. daily, and expected recovery will be 1,800 bbl. daily of propane, L.P.G., and gasoline. The plant will be constructed on a portion of an 80-acre site which Humble has acquired about 1½ miles south of the Opelousas city limits. Contract for the plant has not yet been awarded, but work is scheduled to get under way during the last half of this year. About 1 year will be required for completion. A residential camp is to be build adjacent to the plant site for the 20 to 25 operating employes to be required.

Natural-Gasoline Output At 5,723,000 Gal. Daily

Production of 26-70 natural gasoline equivalent for March in the Mid-Continent and Gulf Coast areas averaged 5,723,841 gal. daily, according to the report of the Natural Gasoline Association of America.

Daily production by states of 26-70 equivalent was:

Texas, 3,844,073 gal.; Oklahoma, 743,929 gal.; Louisiana, 433,579 gal.; New Mexico, 244,213 gal.; Kansas, 210,432 gal.; Arkansas, 157,523 gal.; and Illinois, 90,092 gal.

Baash-Ross News

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It's BAASH-RO[illegible] .. FOR EVERYTHING IN SQUARE KELLYS!

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In fact, Baash-Ross provides everything in square* Kellys!

They have Everything in Performance Features!

● Baash-Ross Square Kellys are forged end-to-end from one solid piece of restricted analysis, fine-grained alloy steel, with each heat of steel individually checked for quality by separate test specimens.

● After forging and before heat treating, the dimensional accuracy of the forged square section is checked by an API Kelly Sleeve Gage which must pass freely over the entire length of the square to check maximum allowable tolerances across flats and across corners. Also, accurate caliper measurements are taken to make sure no portion of the driving section is undersize!

● Next, a series of heat-treating operations performed over the *entire length* of the Kelly in one operation, develop the metallurgical properties of the steel to provide the *best balance* of shock-resisting toughness and wear-resisting hardness.

● Additional heat-treatments harden the threaded ends for maximum life and service.

● All residual forging stresses are relieved by these heat-treating processes, thus eliminating the most prevalent cause of bending and deformation.

● The Kellys are then carefully bored by precision drilling machines so that the bore is precisely centered end-to-end, then double-checked by highly-accurate survey devices. For products with bores 2¼" diameter or larger, wall thickness of the Kelly *must not* vary more than one-*sixteenth* inch for each 10 ft. of product length, or fraction thereof.

● The Kelly itself is also accurately surveyed for straightness and *must* be straight within one-*eighth* inch when measured at *any* point over its entire length.

● The alignment of the projected axis of each threaded end, when checked with the precise Baash-Ross Alignoscope, *must* be within one-*eighth* inch of the longitudinal axis of the Kelly for each 10 ft. of Kelly length, or fraction thereof.

● In addition, threads *must* pass, not only all API specifications, but also unusually rigid Baash-Ross specifications on thread form, taper, lead, finish, etc.

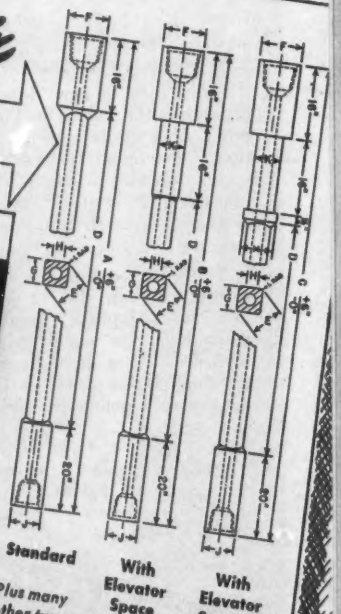
They are Available in

.. All Sizes **.. All Designs**

Baash-Ross "Trubore" Forged Upset Square Kellys

Nominal Size In.	LENGTHS Overall: A Ft.	B Ft.	C Ft.	Working Length D Ft.	Top Upset: Joint Size A.P.I. Left Hand In.	E In.	Bottom Upset: Joint Size A.P.I. Right Hand In.	F In.	Bore: O.D. G In.	I.D. H In.	Across Corners J In.	Across Flats K In.	Elevator Space: O.D. L In.	Corner Radius M In.	Stop Shoulder: O.D. N In.	‡ Cu. Ft. per Lin. Ft.
2½	35 38 40	36-4 39-4 41-4	36-0 39-0 41-0	32 35 37	4½ Reg. 6⅝ Reg.	8⅛* 7⅞	2⅝ Reg 2⅝ LF.	2⅛ 3⅜	1¼s 1¼		3⅜₃₂	2⅛	2⅜₁₆	6/16	3⅝	*.168 .327
3	35 38 40	36-4 39-4 41-4	36-0 39-0 41-0	32 35 37	4½ Reg. 6⅝ Reg.	8⅛* 7⅞	2⅝ Reg. 2⅝ LF.	2⅝ 4⅛	1¼ 1⅝		3¹⁵⁄₃₂	3	2¹⁵⁄₁₆	1/8	4⅛	*.165 .327
3½	35 38 40	36-4 39-4 41-4	36-0 39-0 41-0	32 35 37	4½ Reg. 6⅝ Reg.	8⅛* 7⅞	3⅛ Reg. 3⅛ F.H. 3⅛ LF.	4⅛ 4⅝ 4⅝	1½ 2⅛ 2⅛		4¹⁷⁄₃₂	3½	3¹⁹⁄₃₂	½	4¾	*.166 .327
4¼	35 38 40 54	36-4 39-4 41-4 55-4	36-0 39-0 41-0 55-0	32 35 37 51	4½ Reg. 6⅝ Reg.	8⅛* 7⅞	4½ Reg. 4½ F.H. 4½ LF	8⅛* 5⅝ 6⅛	2¾ 2⅝ 2⅝		5¹⁵⁄₃₂	4¼	4¹⁹⁄₃₂	½	5⅜	*.163 .327
5⅛	38 40 54	39-4 41-4 55-4	39-0 41-0 55-0	35 37 51	6⅝ Reg.	7⅞	5⅛ Reg. 5⅛ F.H. 5½ LF.	6⅜ 7 7⅞	2⅝ 3½ 3½		6⁹³⁄₃₂	5⅛	5⅝	⅝	7	.327
6	38 40 54	39-4 41-4 55-4	39-0 41-0 55-0	35 37 51	6⅝ Reg.	7⅞	6⅝ Reg. 6⅝ F.H.	7⅞ 8	2⅝ 3½	7⅛	6	6⅝	¾	8	.327

Sizes shown in RED are A.P.I. standard.
* Alternate 5⅛ inches O.D.—.180 cu. ft. per lineal ft
‡ Volume based on largest diameter of Kelly



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REFINING

Rosewood to Complete Topping Plant Soon

CORPUS CHRISTI.—Rosewood Oil & Refining Co. expects to complete and have in operation in the next few weeks a small topping plant of 2,000 to 3,000 bbl. daily capacity near Bishop.

The plant will process crude and condensate from nearby Bishop field and produce principally gasoline, kerosine, and fuel oil. Officers of the company include Merle Becker, president; H. R. Smith and Hugo Allen, Alice, and James Sloss, San Antonio, vice presidents; and Raymond Russell, secretary-treasurer. Russell is directing construction and will be in charge of operation of the plant.

Sohio Cracking Unit at Lima, Ohio, Under Way

Construction of an $11,000,000 catalytic cracking unit at the Standard Oil Co. (Ohio) Lima, Ohio, refinery, is now under way. Other major improvement and expansion plans for the refinery have been completed.

The company's engineering and technical divisions have completed detailed plans for the solvent refining plant for the manufacture of lubricating oils, to be built at Toledo, Ohio, but a definite construction schedule has not yet been set up.

Chemicals Company Lets Contract for New Docks

HOUSTON. — Carbide & Carbons Chemicals Corp., which operates a petrochemical plant at Texas City, has let a contract to Nunez Construction Co. to build barge docking facilities at Texas City. The job was let on a bid of $120,298.

A.P.I. Refining Division to Study Corrosion Problems

Corrosion of refinery equipment as the chief obstacle to continuous maximum production of petroleum products, will be the chief subject of discussion on the program of the thirteenth midyear meeting of the Division of Refining of the American Petroleum Institute. The meeting will be held in the Benjamin Franklin Hotel, Philadelphia, May 10-13.

Although the program has been designed as a practical approach to technical problems, but also will prove of interest and benefit to the refinery personnel in supervisory positions, according to Dr. Robert E. Wilson, chairman of the board of Standard Oil Co. (Ind.) and vice president for refining of the institute.

The program of papers and speakers included in the Group Sessions is scheduled as follows:

Tuesday, May 11
8 p.m.

"The Use of Chemicals for Retarding Corrosion," H. L. Bedell, Socony-Vacuum Oil Co., Inc., Augusta, Kans.; and "The Role of Paint in Combating Corrosion in the Petroleum Industry," Paul L. Lotz, Socony-Vacuum Oil Co., Inc., New York.

Wednesday, May 12
10 a.m.

"A Resume of Sohio's Experience in Overhead Condensing Equipment," E. N. Salathe, Standard Oil Co. (Ohio), Cleveland, Ohio; "Prevention of Corrosion in Refinery Heat-Exchanger Equipment," M. A. Furth, Pure Oil Co., Smiths Bluff, Tex.; and "Selection of Valve Materials for Petroleum Application," H. O. Teeple, International Nickel Co., New York.

2 p.m.

"Determining Refinery Training Needs," A. H. Houseknecht, Esso Standard Oil Co., New York; "Preliminary Report on Training Practices in the Refineries of the United States," James R. D. Eddy, University of Texas, Austin, Tex.; "Experiences in Establishing Organized Training Practices," W. J. McClintock, Esso Standard Oil Co., Baltimore, Md., and "Training of Process Operators," Charles P. Baker and H. A. Lutz, Socony-Vacuum Oil Co., Inc., East St. Louis, Ill.

Thursday, May 13
10 p.m.

"The Butane Problem as Viewed by an Integrated Refiner," H. R. Poland, Esso Standard Oil Co., New York; "Problems in the Efficient Utilization of Refinery Butanes," T. L. Apjohn and D. P. Heath, Socony-Vacuum Oil Co., Inc., Paulsboro, N. J.; and "Natural-Gas Butane and Motor-Fuel Vapor Pressure," R. C. Alden and T. W. Lagatski, Phillips Petroleum Co., Bartlesville, Okla.

2 p.m.

"Front-End Volatility as It Affects Processing of High-Octane Number Fuels," L. L. Davis, Continental Oil Co., Ponca City, Okla.; "The Factor of Gasoline Tail-End Volatility," J. Bennett Hill and Walter C. Huffman, Sun Oil Co., Philadelphia, Pa.; and "Refinery Tools for Producing High-Octane Gasoline," T. B. Kimball and J. A. Scott, Sinclair Refining Co., New York.

Chemical Rubber 40 Per Cent of Total Used

Consumption of chemical rubber in the United States during February totaled 35,158 long tons, or more than 40 per cent of total new rubber consumed for that month.

Domestic production of chemical rubber amounted to 39,025 tons for February. This included 30,284 tons

of GR-S, 5,315 tons of Butyl, 2,983 tons of Neoprene, and 443 tons of N-types. Reclaim output was estimated at 24,992 tons.

Of the total chemical rubber consumption 27,900 tons was GR-S, 4,241 tons of Butyl, 2,517 tons of Neoprene, and 500 tons of N-types. Reclaim consumption was 22,017 tons.

Canada's First Fluid Unit To Be Operating by July

Canada's first fluid catalytic cracking unit, now being built by Imperial Oil, Ltd., at its Montreal East refinery, is expected to be in full operation by July, with some of the other units in use earlier.

Construction of the unit, designed for a daily throughput of 11,000 bbl., has been delayed because of the shortages of construction materials. The modernization program was about 70 per cent completed at the end of the year.

Other facilities of the new plant include a 4,200-bbl. daily catalytic polymerization plant, a crude pipe still to handle 13,200 bbl. daily, and additional storage of 2,300,000 bbl.

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Farm and Fuel Forum Scheduled May 24-26

The relation of food production to farm fuels will ccupy the center of interest at the Food and Fuel Forum, sponsored by the American Petroleum Institute's Agricultural Development Committee, to be held at the Loraine Hotel, Madison, Wis., May 24-26.

The Food and Fuel Forum will center around the rapid advance in power farming and the resulting increase in petroleum demands from agriculture.

Ethyl Corp. Increases Antiknock Compound Price

Ethyl Corp. has announced a price increase in antiknock compound, effective June 30. "Ethyl" antiknock, formerly 49.482 cents, will be 54.98 cents per pound of tetraethyl lead content for Motor Mix (equivalent to 20 cents per c.c.) and 60.478 cents per pound of tetraethyl lead content for Aviation Mix (equivalent to 22 cents per c.c.)

This is Ethyl Corp.'s first price increase since April 1942.

Refining Expenditures in Pennsylvania Announced

Postwar capital investments by 15 refining companies in Pennsylvania will total more than $121,097,000 by the end of 1948, according to a survey completed recently by the state's department of commerce.

In addition, capital expenditures of 39 chemical and chemical-products companies during the same period will total about $45,365,000, according to the survey.

Jersey Affiliates Run 16 Per Cent of World Crude

Refinery runs of crude oil by affiliates of Standard Oil Co. (N.J.), averaged 1,306,000 bbl. daily during 1947, according to the company's annual financial statement released April 27.

Runs in domestic refineries averaged 703,000 bbl. daily, while runs in foreign refineries averaged 603,000 bbl. daily, the report said.

The domestic figure was about 14 per cent of the total runs in the United States. Total runs, both domestic and foreign, accounted for about 16 per cent of the world total.

The Aruba refinery in the Netherlands West Indies had a higher output than any other Jersey refinery, with average runs of 360,000 bbl. daily.

The report said the 60,000-bbl. daily refinery of Creole Petroleum Corp. at Amuay, Venezuela, will be completed late in 1949.

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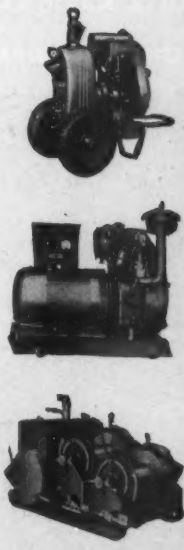

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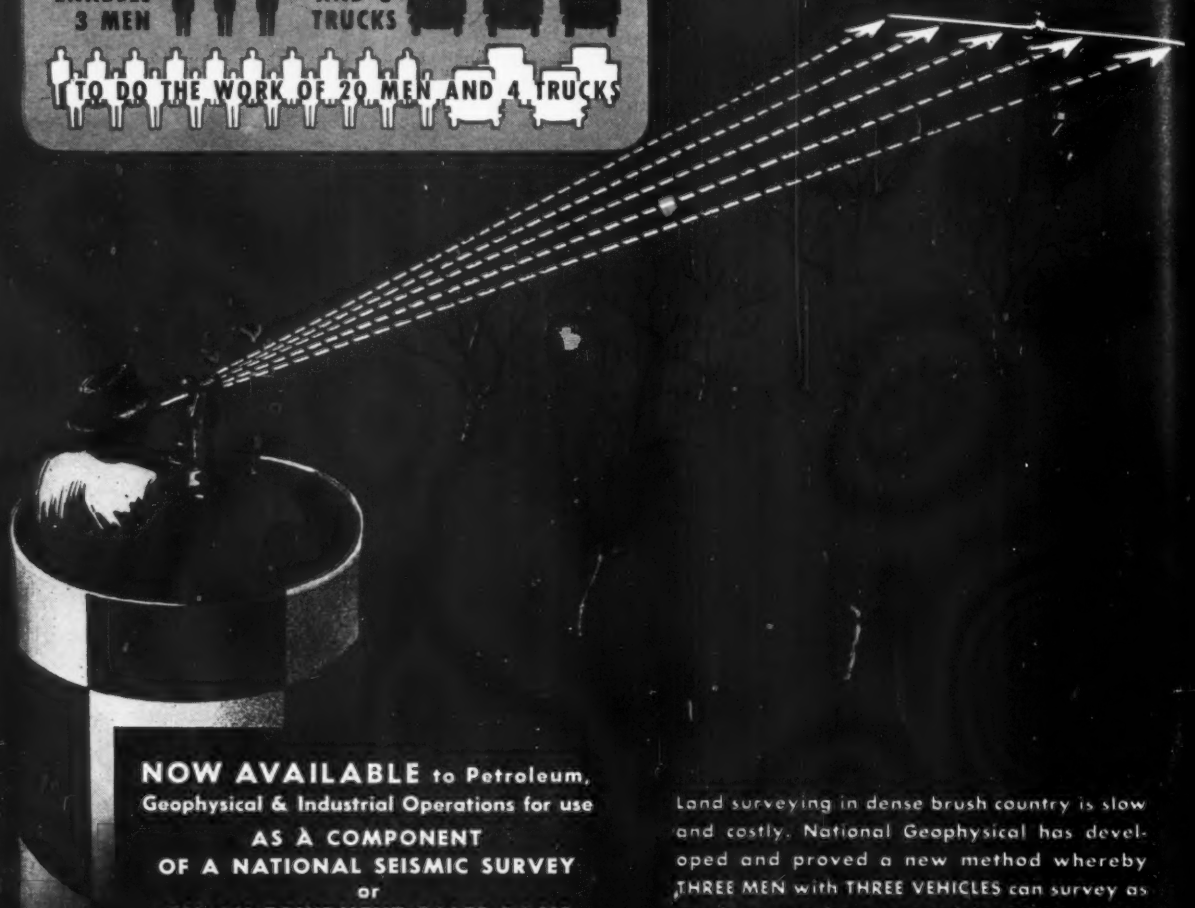

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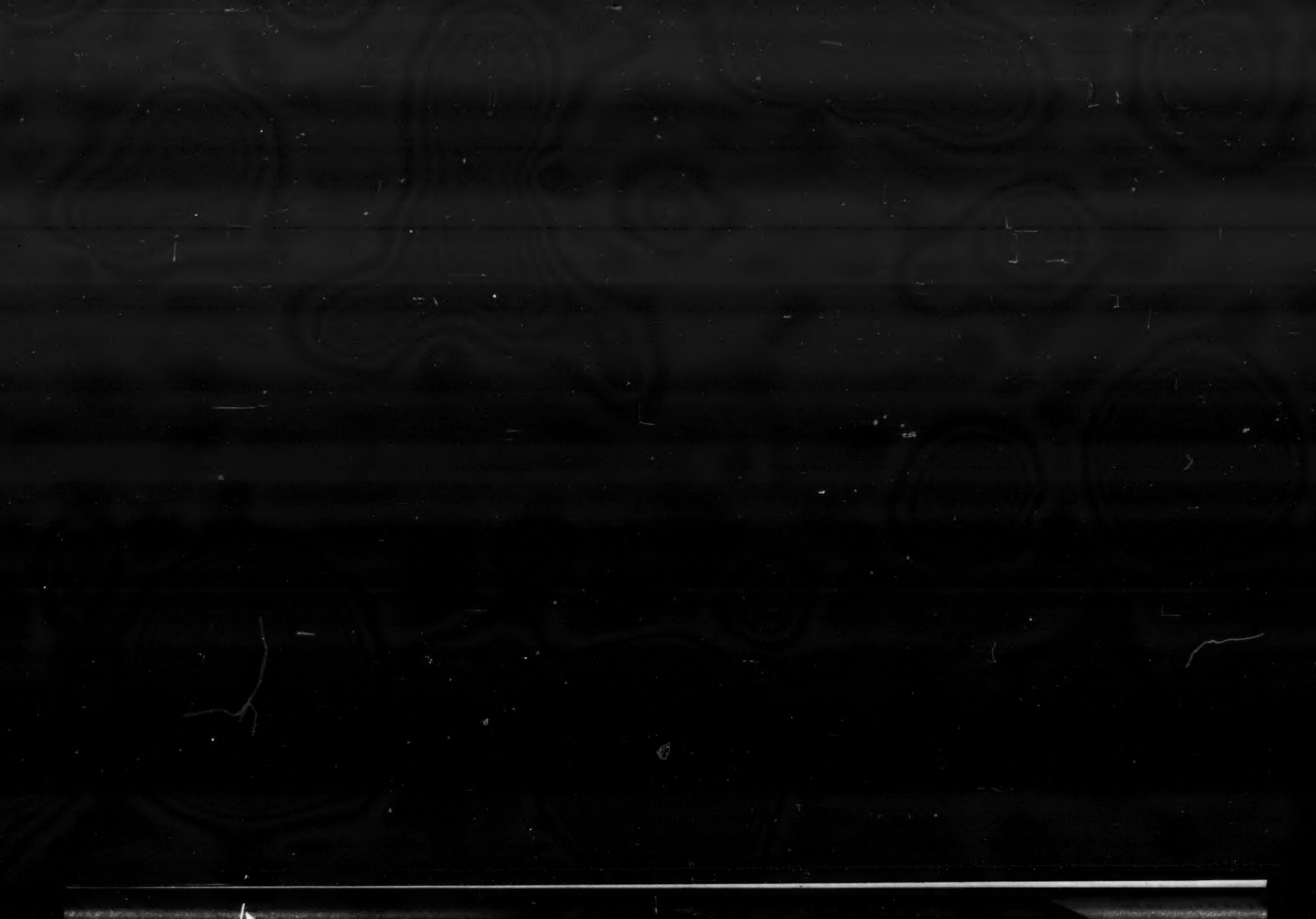

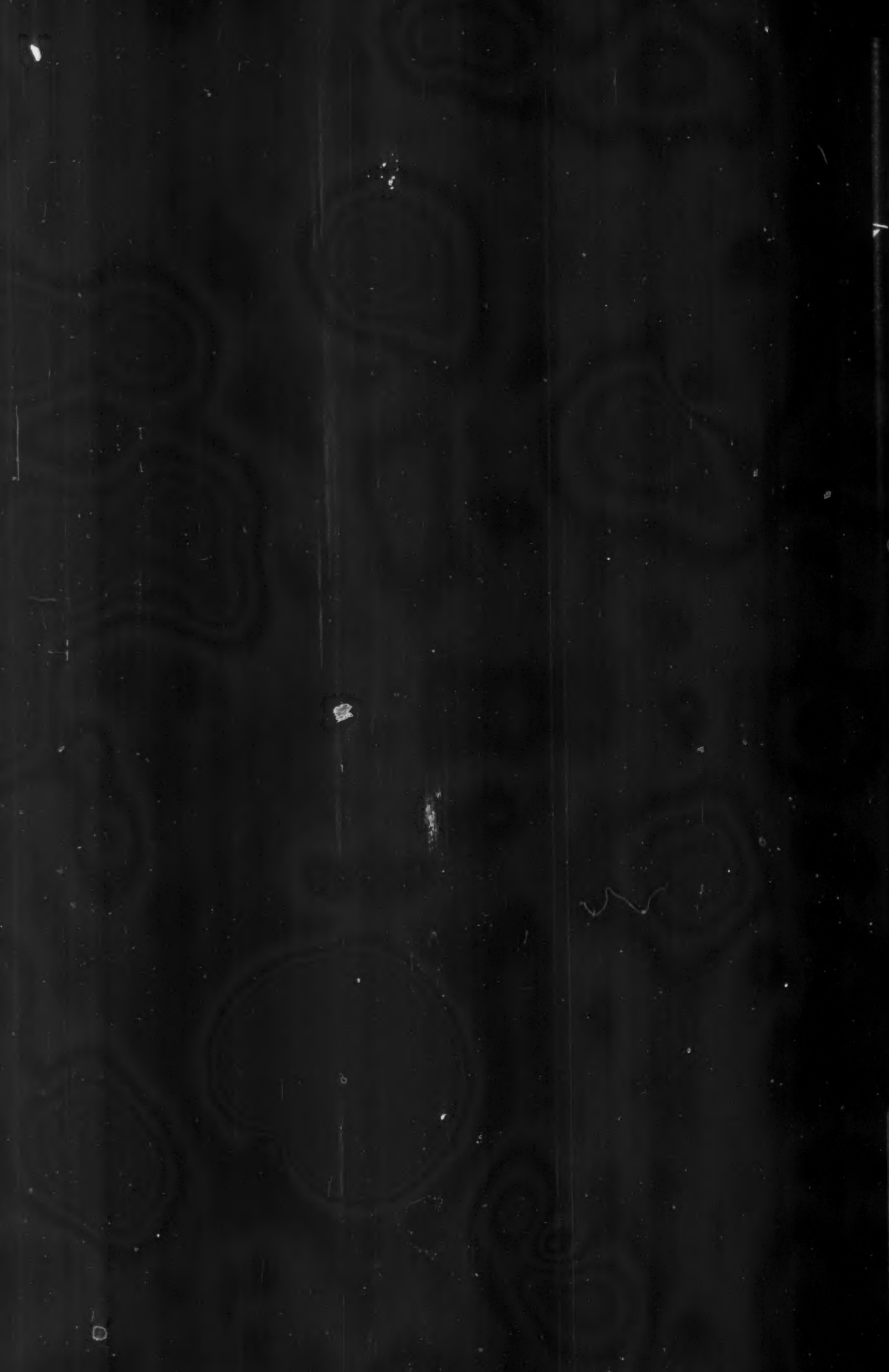

Exploration and Drilling

Montana Lease Play Stirred By Canadian Discovery

REPORTS that filings have been made on tens of thousands of acres of federal lands in Teton and Pondera counties, northwest Montana, as a result of the Gulf Oil Co. strike at Pincher Creek in Canada are not surprising. *(See The Oil and Gas Journal, April 1, 1948, page 295.)*

North of the present leasing activity lie the Blackfeet Indian lands, then Glacier National Park. There is little prospect at the present time that the park land will ever be open to drilling, barring some dire national emergency. But the Indian lands probably can be obtained by competitive bidding. It can certainly be taken for granted that many a geologist is searching his library for two old U.S. G.S. Bulletins; No. 641 (1917) pages 281-305, "Anticlines in the Blackfeet Indian Reservation, Montana;" and No. 691 (1919), pages 149-184, "Oil and Gas Geology of the Birch Creek-Sun River Area, Northwestern Montana."

In the meantime, although the first test has not yet been completed, Gulf is rigging up for 1 Walter Marr in 29-4-29w4, about 7 miles north and 4 miles west of the discovery well 1 Pincher Creek in 24-3-29w4. (Canadian section numbering starts in southeast corner of township; hinge a U. S. township plat along north side, pick it up and flop it over so that south end becomes the north, and section numbers will check Canadian surveys.)

The discovery well, after overcoming freezing problems in tubing, has made from 328 to 350 bbl. of condensate per day through chokes, along with 9 to 12 million cubic feet of gas, ratios varying from 35,700 down to 28,000 cu. ft. per barrel. All this has come from 100 odd feet of Madison lime pay. This indicates the gas is as "wet" as that on the crest of the famous Turner Valley field, and much richer than the somewhat disappointing Jumping Pound strike. Gulf is now attempting to drill deeper to see if a second porous zone is to be found in the Madison.

The Pincher Creek block of something over 100 sections is reported to have been taken on the basis of the first refraction seismograph shooting in Alberta. Reports are that excellent records were obtained. The block is fairly solid in a northwest-southeast trend roughly 12 miles long and 7 miles wide. This is a natural trend following the regional strike of the mountains and the disturbed belt in the foothills resulting from the thrust faulting.

The location of the second well suggests that the records indicate a long anticline following the regional strike, with probably two local highs on the anticline. Whether there is a local faulting of a substantial nature in the structure is of course not known publicly. The location picked for the second well indicates not only a good possibility of two local highs on the anticline, but also Gulf's confidence in its interpretation of the seismic records. Evidently the company intends to find out quickly whether it has another Turner Valley at Pincher Creek.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN.—Shows of oil have again been encountered by Pure Oil Co. in the West Poison Spider, Natrona County, Wyoming, wildcat. The well is now drilling below 14,270 ft., the deepest to be drilled in the Rocky Mountains. Oil was recovered by Continental Oil Co. at the first deep test in the Little Buck Creek field, Niobrara County, Wyoming. Saturation was in the Converse sand at 5,206-49 ft., and 540 ft. of 18°-gravity oil was recovered on 45-minute test. Texas' second Adon well is now drilling below 7,792 ft. and running high structurally.

PERMIAN BASIN.—Latest drill-stem test at Mid-Continent's northeast Lea County Ellenburger prospect, reported the well started unloading after recovering part of water cushion, giving final recovery of 9,720 ft. of oil, in 4 hours, from 12,181-12,214 ft. In Howard County, West Texas, confirmation well at Vealmoor greatly exceeds the discovery well, making a flow calculated to rate 450 bbl. of oil an hour, from 92 ft. of pay section.

NORTH TEXAS.—Standard Oil Co. 1 Moon extended the Sherman pool of northern Grayson County 1 mile south. Successful drill-stem tests were made at 3,900-85, 4,232-46 and 4,287-99 ft., recovering 90 ft., 940 ft., and 670 ft. of 37°-38°-gravity oil.

EAST TEXAS.—Travis Peak sand has been opened to gas-distillate production in the West Longwood field of Harrison County, giving the area its fourth pay. The discovery well is Sells Petroleum Co. 1 Taylor, which had 3 pay sections from 6,000-6,100 ft.

UPPER GULF COAST.—Stanolind Oil & Gas Co. has started construction of a drilling platform about 12 miles out in the Gulf of Mexico off Galveston County shore line. The State-Gulf of Mexico No. 1 test will be first of a series of four offshore operations. It is spotted 6,600 ft. from the east line and 1,500 ft. from the north line of Section 144.

SOUTHWEST TEXAS.—Interest in Railroad Commission District 1 took a decided upswing this week with the following deep wildcat tests of unusual importance being started: Sun Oil Co. in the old Pryor or Cow-Hill area in Zavala County; United North & South Development Co. on the far west side of the Luling field structure in Caldwell County; Universal Petroleum Co. 2 miles northeast of Utopia in Banders County, and 3½ miles southeast of Utopia in Uvalde County; E. Cockrell & Continental Oil Co. 4 miles southeast of Big Wells in Dimmit County.

ARIZONA.—The first of three wildcats planned for central Arizona has been started by the Glenn Oil Co. in 2-3n-4e, Maricopa County, about 23 miles northeast of Phoenix.

EASTERN TEXAS

Humble's Deep Test Has Oil and Gas Shows

DALLAS.—Humble Oil & Refining Co. 1 R. P. McWatters, Freestone County test 1½ miles south of the Freestone townsite, was still making hole below 12,152 ft. in shale, on last report. At 11,952 ft., in shale with streaks of sand, operators found it necessary to condition mud 1 hour before coming out of the hole to change bits, due to gas cutting the mud. The last reported section showing gas was at 11,545-575 ft., by samples, in the Cotton Valley, which showed brown, medium-grained sand being porous to slightly porous, with gas and light oil stains. The samples were said to have justified a drill-stem test but samples were late in getting in and the hole had progressed another 100 ft.

W. B. Hinton 1 J. M. Criswell estate, Travis Peak test in the G. M. Walters Survey, Henderson County, was drilling below 5,600 ft. in lime and shale. It had the Woodbine at 4,284-4,300 ft., and the Comanchean lime at 5,110-40 ft., by samples.

In Kaufman County, T. D. Humphries 1 E. B. Tuggle, Paluxy wildcat 4 miles east of Kemp, in the Ed Fitzgerald Survey, was drilling at 3,800 ft. It logged the Woodbine at 3,440 ft., the sub-Clarksville at 3,025-75 ft., with no shows, Red Beds at 3,585 ft., and top of the Dexter sand at 3,706 ft.

In Limestone County, R. Flippen Survey, R. J. R. Oil Corp. 1 Jones Heirs was shut down at 3,695 ft. and waiting on casing. At 3,596 ft., with packer set at 3,510 ft., a 30-minute drill-stem test flowed a small amount of dry gas and recovered 30 ft. of mud, with no shows. At 3,691 ft. the bit was in soft lime and it started losing returns and operators were pumping mud into the hole, with no results.

EAST TEXAS (DISTRICTS 5 & 6) WILDCAT FAILURE

Hopkins County: F. R. Jackson 1 W. A. Stewart, Francis Hopkins Sur., A-1,180, 12 mi. N Sulphur Springs, 1 mi. NE Tira, dry, TD 4,269 ft., Paluxy 4,108 ft., by samples, elev. 460 ft., had salt water in Woodbine and Paluxy.

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APPALACHIAN FIELD

Hope Natural Plans Test Near Recent Gas Strike

PITTSBURGH.—In Grant district, Jackson County, West Virginia, in the vicinity of the recent Oriskany gas strike on the Nathaniel Waterbury farm, Hope Natural Gas Co. has a location for a test on Lee Batten farm which, located on the Belleville Quad, is 3.75 miles south 39° 05′ and west 1.50 miles 81° 35′ and starts at an elevation of 925 ft. United Fuel Gas Co. has made 2 locations for tests in the area and the one on the J. R. Archer farm, elevation 895.76 ft., is found 4.8 miles south 39° 05′ and 0.45 mile west 81° 35′, while the one on the Charley Boyce farm is 4.7 miles south 39° 05′ and 1.1. mile west 81° 35′ starting at an elevation of 782.77 ft.

In Steele district, Wood County, United Fuel Gas Co. topped the Clinton sand at 6,075 ft. in the wildcat on M. A. Webber farm and the Red Medina at 6,212 ft. The surface elevation is 818 ft. with the Corniferous lime at 4,519 ft. and the Oriskany 4,613-61 ft.

New locations totaled 19 and were in Pleasant district, Clay County; Grant and Ravenswood districts, Jackson County; Union district, Marion County; Graham district, Mason County; Harvey district, Mingo County; Trap Hill district, Raleigh County; Clay and Grant districts, Ritchie County; Booths Creek district, Taylor County; Williams district, Wood County, and Center district, Wyoming County.

On Chestnut Ridge in Georges Township, Fayette County, southwest Pennsylvania, New Penn Development Co. et al attempted to remove the tools and entire cable which had been left in the hole when the large Onondaga gas well blew in on the Mary Il Smith farm, but after jarring for 9 hours with a firm hold with a three-prong grab on the cable, recovered only 100 ft. of line. The well had gaged over 14,000,000 cu. ft. gas in the line, initially, and was down to below 2,000,000 cu. ft. The gas was turned in the line for the night and when checked in the morning had increased to over 6,000,000 cu. ft., holding a backpressure of 530 psi. on the well. It was blown down ejecting some sand and a little bottom water but is still gaging 6,000,000 cu. ft. in the line.

SOUTHWESTERN PENNSYLVANIA SUCCESSFUL WILDCAT

Clarion County, Monroe Township: Peoples Natural Gas Co. 1 J. A. Smith, 750,000 cu. ft. gas, TD 844 ft.

WEST VIRGINIA WILDCAT FAILURES

McDowell County, Elkhorn district: Hope Natural Gas Co. 9,161 Crozer Land Co., dry, Ravencliff sand 1,038 ft., Big lime 2,700-3,573 ft., Weir 3,775-3,925 ft., Gritty lime 4,302-4,410 ft., shale 4,410-412 ft., shot 4,370-80 ft., gage 33,000 cu. ft. gas, plugged, TD 4,500 ft.

Monroe County, Springfield district: Godfrey L. Cabot, Inc., 1,252 Genevieve Larew, dry, gas and water 2,405 ft., gas 2,552 ft., water failed to exhaust, plugged, TD 3,574 ft.

CALIFORNIA

Paloma Field Extended; Two Discoveries Noted

LOS ANGELES.—Two shallow oil discoveries and a probable westward extension of Paloma field highlighted California drilling activities during the past week. First of the shallow discoveries was made north of San Francisco in the Petaluma area of Sonoma County, at the Trico Oil & Gas Co. 1 Petaluma Community, 30-5n-6w. According to latest reports, the well swabbed oil at the rate of 50 bbl. daily. Gravity of the oil is 20° and water cut less than 1 per cent. Total depth of the well is 971 ft. with the top of the oil sand at 946 ft.

The Petaluma strike is of importance from two standpoints. Primarily, it is the first commercial oil production in Sonoma County and may lead to intensified future exploration in the northern California counties. Also, should a field of importance be developed here, it would be the closest oil field to San Francisco and the refineries in that area.

Second of the shallow oil discoveries last week was in the Placerita Canyon area of Los Angeles County. Here Nelson Phillips Oil Co. claimed a new strike when its 1 Kraft, 31-4n-15w, came in flowing at an estimated rate of 70 to 100 bbl. daily of 15.6°-gravity crude. The well originally was carried to a total depth of 2,242 ft., but plugged back to 717 ft. before completion. With 7-in. casing cemented to total depth, the well is reported to have cored 290 ft. of sand showing oil. Operators report, however, that only 130 ft. of this sand is open to production at present. The well is expected to be placed on pump for a 30-day production test.

The 1 Kraft is located approximately 1½ miles north of formerly producing wells in the Whitney Canyon area of the Newhall fields. There were only three wells in this area and all of these have been idled or abandoned since 1937. Production at that time was approximately 5 bbl. per well per day, and gravity of the oil averaged 13°. The oil produced by these wells came mostly from the uppermost Pliocene and Pleistocene, with a small amount being obtained from the Eocene. Producing formation in the 1 Kraft has not been announced but it is probably upper Pliocene.

Richfield Oil Corp. apparently is on the verge of moving the western limits of Paloma field out another ½ to ¾ mile with its 78-24 M. & L., 24-31s-25e. This well has encountered the Paloma sand at 11,075 ft. and has cored two possible productive zones between this depth and total depth of 11,323 ft. Casing has been set to 11,215 ft. and operators currently are preparing to test the upper zone from 11,065-11,170 ft. Quality and character of the sand cored has not been revealed, but Richfield officials state that it is quite similar to that found in two Ohio Oil Co. wells recently completed 1 mile and ½ mile east of the 78-24 M. & L. One of the Ohio wells is on production from the two zones and the other, a northwesterly extension well, has tested the upper zone for 2,500,000 cu. ft. of wet gas. Should the upper zone prove productive in the Richfield well, it will be tied in with the lower zone and the well completed.

CALIFORNIA SUCCESSFUL WILDCATS

Fresno County, Northeast Coalinga area: Sharples Oil Corp. 3 Hyde, 6-19s-16e, flowed 550 bbl. 28.0°-gravity oil daily through ½-in. choke, water cut 20.0 per cent, 2½-in. tubing 8,210 ft., packer 8,197 ft., elev. 602 ft., TD 8,788 ft.

Kern County, McDonald Anticline area: San Joaquin Exploration Co. 8 Layman, 12-28s-19e, pumped 30 bbl. 16.0°-gravity oil daily, water cut 20.0 per cent, 2½-in. tubing 730 ft., TD 787 ft.

Santa Barbara County, Zaca area: Tide

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Water Associated Oil Co. 35 David, 33-8n-31w, pumped 366 bbl. 9.0°-gravity oil in 17½ hours, water cut 10.0 per cent, elev. 1,096 ft., TD 4,810 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Antelope area: The Texas Co. 1 Voight Two, 32-27s-20e, dry, elev. 785 ft., Phacoides 5,472 ft., Oceanic 5,670-80 ft., TD 5,935 ft.

Ant Hill area: Richfield Oil Corp. 1 Shaw, 8-29s-29e, dry, elev. 762 ft., Olcese 2,080 ft., Jewett 3,895 ft., Pyramid Hills 4,135 ft., Vedder 4,303 ft., Walker 4,654 ft., TD 4,660 ft.

Comanche Point area: Sierra Oil Co. 1 Sierra, 33-12n-18w, dry, elev. unknown, Santa Margarita 920 ft., Fruitvale 1,244 ft., Olcese 1,550 ft., TD 1,594 ft.

Cymric area: Pacific Western Oil Corp. 43 Anderson, 19-29s-21e, dry, elev. unknown, Phacoides 1,430 ft., Point of Rocks 2,002 ft., TD 2,400 ft.

Edison area: First National Finance Corp. 1 DeMille-Bigger-First National, 17-30s-29e, dry, elev. 498 ft., Santa Margarita 3,560 ft., TD 3,629 ft.

McFarland area: Independent Exploration Co. 74-1 Wright-Bloemer, 11-26s-26e, dry in granite, elev. 585 ft., McVan 3,310 ft., Olcese 3,346 ft., Pyramid Hills 4,396 ft., first Vedder 4,402 ft., second Vedder 4,500 ft., third Vedder 4,705 ft., fourth Vedder 4,973 ft., Famosa 5,250 ft., granite 5,788 ft., weathered granite 5,752 ft.

San Emigdio area: Continental Oil Co. 1 Santiago, 8-11n-22w, dry, elev. 615 ft., Miocene 9,795 ft., TD 9,919 ft.

Sharktooth area: Barnsdall Oil Co. 1 Ogier, 15-28s-28e, dry in gray sand, elev. 1,152 ft., Pyramid Hills 2,843 ft., Vedder 2,910 ft., TD 2,935 ft.

Santa Barbara County, Point Conception area: Independent Exploration Co. 1 Sudden, 26-6n-36w, dry in basalt, elev. 352 ft., TD 2,513 ft.

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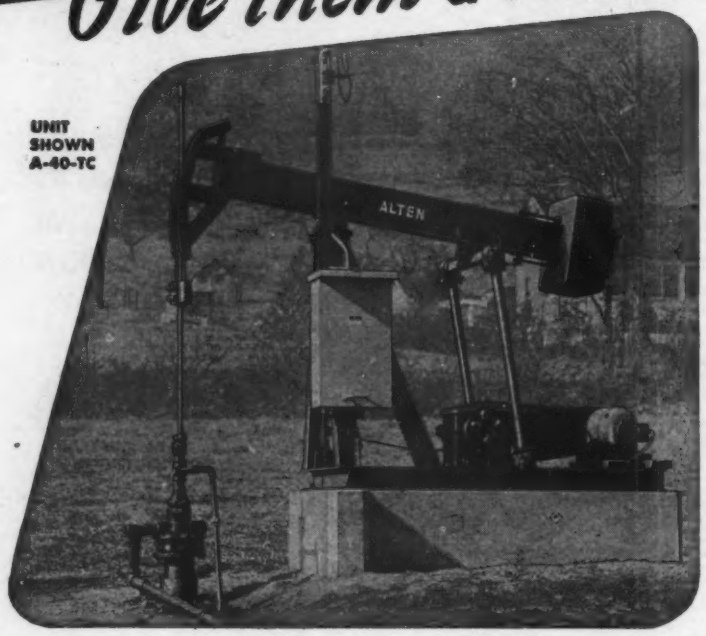

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TEXAS GULF COAST

Chapa Field Gets New Gas-Condensate Pay

HOUSTON.—A new gas-condensate pay for Chapa field, Live Oak County, has been completed at Continental Oil Co. 4 Somerset Land & Cattle Co., in TTRR Survey 319, 15 miles southwest of George West. Drilled to a total depth of 10,356 ft., this well flowed 120 bbl. of condensate per day and 4,180,000 cu. ft. of gas per day through a 7/32-in. choke, with 4,400 psi. working, shut-in pressure 5,000 psi. Gravity was 55°, with no water in the flow. Open flow gage was 13,300,000 cu. ft. gas per day. Production is through perforations at 9,160-9,200 ft.

A new oil pay for Sabine Tram field at Newton County was opened by Gulf Oil Corp. C-2 J. R. Bevil, Sr. et al, in R. I. Richardson Survey, flowing 38 bbl. of oil per day plus 285 bbl. salt water, through ¼-in. choke. Total depth is 8,531 ft. with perforations at 7,785-89 ft.

Cities Service Oil Co. 7 Mariker Lumber Co. fee in Nancy Fuller League, opened a new oil pay at Saratoga field, Hardin County. Total depth is 5,455 ft., with top of sand at 5,064 ft., and perforated for completion at 5,064-5,110 ft. Initial production flowed 248 bbl. of oil per day through a 13/64-in. choke, with gas-oil ratio 555. Gravity 38.7°.

Fullerton Oil Co. and Ryan Consolidated Petroleum 1 Carrie McDonald, prospective deep oil discovery well in the Long Mott area, 4 miles north of Seadrift, in Calhoun County, has set 7-in. casing on bottom at 9,922 ft. A drill-stem test at 9,645-61 ft. had indicated oil production from a sand topped at 9,638 ft. in the Frio-Vicksbrug zone. Operators plan to drill deeper before making production test.

There were 35 new locations reported this week for Districts 2 & 3, 10 being wildcat starts, 1 each in Bee, Brazoria, Chambers, Galveston, Harris, Matagorda, Montgomery, Orange, Polk and Refugio counties. Four successful exploratory wells were completed, 1 each in Hardin, Jackson, Live Oak and Newton counties, while 10 wildcats were dry, 3 in Harris, and 1 each in Burleson, Fayette, Karnes, Live Oak, Orange, Refugio and Wharton counties.

UPPER GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Hardin County: New oil pay Saratoga field Cities Service Oil Co. 7 Mariker Lbr. Co. fee, in Nancy Fuller League, TD 5,455 ft., top sand 5,064 ft., perf. 5,064-5,110 ft., IP: 248 bbl. oil per day through a 13/64-in. choke, GOR 555, TP 510 psi., CP 700 psi., gravity 38.7°, no water.

Jackson County: New oil discovery—Humble O. & R. Co. D-2 Four-Way Ranch, in Lot 86, First Registered Subd. of La-Ward Farms, in I&GN Sur. 12, 3 mi. E-NE of Lolita and 1 mi. E-NE of Lolita field, top pay 5,824 ft., TD 8,710 ft., perf. 5,824-29 ft., IP: 220 bbl. oil per day through 5/32-in. choke, GOR 716, TP 1,185 psi., CP 2,000 psi., gravity 33.1°, 0.1 per cent water.

Live Oak County: New gas-condensate pay Chapa field—Continental Oil Co. 4 Somerset Land & Cattle Co., in TTRR Sur. 319, 15 mi. SW of Geo. West, top Lower Wilcox 10,218 ft., top pay 9,160 ft., perf. 9,160-9,200 ft., TD 10,356 ft., IP: 4,180,000 cu. ft. gas per day and 120 bbl. condensate per day through 7/32-in. choke, 4,400 psi. WP, shut-in pressure 5,000 psi., gravity 55°, no water. Flowed 13,300,000 cu. ft. gas on open flow, GOR 34,833.

Newton County: New oil pay Sabine Tram field—Gulf Oil Corp. C-2 J. R. Bevil, Sr., et al, in R. I. Richardson Sur., A-1198, TD 8,531 ft., top sand 7,785 ft., perf. 7,785-89 ft., IP: 38 bbl. oil per day and 285 bbl. salt water per day, through ¼-in. choke, GOR nil, TP 200 psi., gravity 36°.

UPPER GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Burleson County: General American 1 Daisy Jordan et al, in Sam Lawrence Sur. A-36, 4 mi. E of Snook townsite, dry, TD 2,507 ft.

Fayette County: Bluebird Inv. Co. 1 C. F. Schlottman, in Wm. J. Russell Lge., 8 mi. NE of LaGrange townsite, dry, TD 7,497 ft.

Harris County: Phil Harris & Alice Faye 1 M. G. Piel, Alex Gulliver Sur. A-287, off SE side of Hockley Dome, dry, TD 8,008 ft.

Houston Oil Co. of Texas 2 Eugene L. Bender Est., J. W. Singleton Sur., San Jacinto field area, dry, TD 8,630 ft.

Texana Pet. Co. 1 Adeline G. Meyer et al, in C. V. Uglow Sur. A-819, 1¾ mi. W of Almeda townsite, dry, TD 8,041 ft.

Karnes County: Seaboard Oil Co. of Dela. 1 Nick Gabrysch, in Don Erasmo Seguin Grant, 8 mi. W-NW of Karnes City, dry, TD 11,181 ft.

Live Oak County: Humphries & Hotchkin 1 Schultz Live Stock Land Co., in John Hefferman Sur., 4 mi. N of Three Rivers, dry, TD 1,742 ft.

Orange County: Standard Oil Co. of Texas 1 Mary Ann Peveto Unit, in C. West Sur., A-27, 3,600 ft. NE of Orange field production, dry, TD 7,199 ft.

Refugio County: Mackhank Pet. Co. B-2 F. V. W. Heard, in Mary & Ann Roche Sur., 4 mi. W of Refugio and ½ mi. W of Refugio field, dry, TD 7,194 ft.

Wharton County: J. E. Ferguson-Temple Hargrove and C. Andrade 1 F. E. & M. Appling, in I&GN Sur., Sec. 9, Lakeview gas area, dry, TD 5,550 ft.

N. CENTRAL TEXAS

Fourth Pay Zone Is Found in Kendall Field

WICHITA FALLS.—A fourth pay zone, in the Bend Conglomerate, for the active Kendall field of southwestern Young County was indicated at Superior Oil Co. 4 Ben G. O'Neal, Block 4, J. Poitevent Survey. The well had top of the conglomerate at 4,269 ft., and drill-stem tested from 4,269-78 ft., recovering 200 ft. of 43°-gravity oil in 24 minutes. Bottom-hole pressure was 2,050 psi. Operators drilled ahead.

A new shallow-sand pay for Holbert Caddo field of western Young County was also promised at Warren Oil Corp. 8 Fred Dowdy, Block 721, TE&L Survey, 2½ miles southwest of Profitt. A 75-minute drill-stem test from 2,577-86 ft. showed gas at the surface in 6 minutes and flowing oil at the end of 70 minutes. In the 5 minutes it was allowed to flow, it made 16 bbl. of oil, plus a small amount of oil-cut mud. Operators ran electrical survey to bottom and set casing to 2,579 ft.

In Runnels County, Standard Oil Co. of Texas 1 Lilly heirs estate, Burnet County School Land Survey, 1 mile north of Norton, ran a 2-hour drill-stem test in the Palo Pinto limestone from 3,975-99 ft., which showed gas at the surface in 27 minutes and recovered 240 ft. of oil-cut mud, 60 ft. of clean oil, and 60 ft. of salt water. Drilled deeper, it showed additional shows in the lime to 4,030 ft., plus an increase of salt water. Details were not available, but it was reported to have flowed oil by heads while the pipe was being pulled. The second test was made from 4,016-30 ft.

In Fisher County, 3 miles south of Roby, Exploration Drilling Co. 1 H. S. Newman was drilling below 5,782 ft. and was looking for the Ellenburger. Operators reported the Strawn as dry but details were lacking. One mile east of Royston, S. B. Roberts 1 P. H. Oseik, Ellenburger wildcat, was below 3,295 ft. Operations were held up by a fishing job. Contract depth is 6,200 ft.

In Wise County, Mid-Continent Petroleum Corp. 1 Kaker, S. Wood Survey, was drilling ahead below 5,710 ft., after a delay caused by collapsed casing. Burk Royalty

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Co. 1 Maguire, H. H. Bradford Survey, 3½ miles northwest of Chico, was drilling below 5,597 ft. Cities Service Oil Co. 1 Berry, southwest offset to the Chico pool discovery, swabbed down to total depth of 5,781 ft., with no shows in the basal conglomerate. It was to be plugged back and casing perforated from 5,276-5,300 ft.

Another well was in prospect for the southeast extension area to Bailes field of Throckmorton County, 3 miles southeast of Throckmorton, at James H. Snowden et al 2 Gober, Block 3, Day Land & Cattle Co. Survey. Top of the Caddo was reported at 4,151 ft., and an 18-minute drillstem test between 4,151-71 ft. brought gas to the surface in 3 minutes and oil in 8 minutes. It was allowed to flow for 10 minutes, gaging 15 bbl. of oil. A second test, from 4,221-34 ft., failed due to mechanical difficulties but recovered 90 ft. of clean oil and 430 ft. of oil and gas-cut drilling mud with no water. Operators were to drill deeper.

NORTH CENTRAL TEXAS (DISTRICTS 7-B & 9) SUCCESSFUL WILDCAT

Shackelford County: Welch & White 1 C. A. Nail, Sec. 126, ETRR Sur., 14 mi. NW Albany, flowed 26 bbl. 37°-gravity oil, sand 1,343-45 ft., TD, GOR 600 cu. ft., casing pressure 160 psi., tubing pressure 50 psi.

NORTH CENTRAL TEXAS (DISTRICTS 7-B & 9) WILDCAT FAILURES

Archer County: G. F. LeBus, Jr. et al 1 A. Mangold, Blk. 14, McKinney & Williams Sur., 2 mi. NW Mankins, dry, TD 4,900 ft., KMA 4,029 ft., Caddo 4,495 ft., Ellenburger 4,893 ft., dolomite 4,916 ft.

R. C. Lipscomb 1 L. A. Snider, Sec. 2,601 TE&L Sur., 7 mi. SW Windthorst, dry, TD 4,755 ft., Caddo 4,682 ft., elev. 1,057 ft.

Callahan County: Star Oil Co. 1-B W. T. McClure, E. Shipman Sur., 5½ mi. SE Admiral, dry, TD 4,051 ft., Caddo 3,042 ft., Mississippi 4,002 ft., Ellenburger 4,026 ft.

R. F. St. John and S. B. Roberts 1 A. E. Dyer, Sec. 41, BBB&C Sur., 4 mi. NW Clyde, dry, TD 4,833 ft., Caddo 4,320 ft., Mississippi 4,625 ft., Ellenburger 4,765 ft., elev. 1,920 ft.

Clay County: Frank Wood 1-A C. T. Maddox, Blk. 17, Angelina CSL G. Wagoner Sur. A-3, 10 mi. NE Henrietta, dry, TD 5,973 ft., Canyon 2,370 ft., Ellenburger 5,890 ft.

Cooke County: Fleet Drilling Co. et al 1 Campbell, M. Alexander Sur., A-6, 2 mi. N Lindsey, dry, TD 2,064 ft. in shale and lime.

Eastland County Claude Bell et al 1 H. O. Files, Sec. 1, Blk. 1, H&TC Sur., 2 mi. NE Gorman, dry, TD 3,332 ft., Barnett shale 3,185 ft., Mississippi 3,283 ft.

Fisher County: Roark, Hooker & Roark 1 R. W. Cooper, Sec. 198, BBB&C Sur., 5 mi. SW Hamlin, dry, TD 5,210 ft., Dotham 2,730 ft., Noodle Creek 2,845 ft., Saddle Creek 3,085 ft., Swastika sand 3,890 ft., Reef lime 5,160 ft.

Haskell County: Pan American Producing Co. 1 J. W. Brown, Sec. 19, Blk. 1, BBB&C Sur., 3 mi. NW Stamford, dry, TD 2,429 ft., Saddle Creek 2,043 ft., Flippin 2,120 ft., King sand 2,390 ft., elev. 1,514 ft.

Jones County: Carl Hovgard 1 J. W. Poer, Sec. 65, Blk. 1, BBB&C Sur., 5 mi. NW Anson, dry, TD 3,850 ft., Flippen 2,395 ft., no Swastika sand, Hardy sand 3,850 ft.

Knox County: W. J. & J. J. Moran 1 Doris Mulkey, Sec. 151, H&TC Sur., 3 mi. SW Turscott, dry, TD 6,342 ft., Mississippi 6,235 ft.

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SOUTH LOUISIANA

New Gas-Condensate Sand Found in Valentine Field

NEW ORLEANS.—A new gas-condensate sand for Valentine field in Lafourche Parish has been completed at The Texas Co. 1 Luke Guidrez, 51-17s-20e. Drilled to a total depth of 12,780 ft., this well flowed an initial production of 25 bbl. of condensate and 4,852,000 cu. ft. of gas per day through a 3/16-in. choke. Gravity was 51.4°. Production is through perforations at 11,036-91 ft. Top of sand 11,036 ft.

In Bivens field, Beauregard Parish, Atlantic Refining Co. B-1 Newport Industries, Inc., has been completed, flowing 109 bbl. of 44.8°-gravity oil through a ½-in. choke, flowing pressure on tubing 900 psi., with gas-oil ratio of 300. Total depth is 7,812 ft., with top of pay at 7,285 ft., and perforations at 7,258-78 ft.

The Texas Co. 4 State-Barataria, record deep wildcat 1½ miles north of nearest production in the Queen Bess Island area of Jefferson Parish, is at a total depth of 16,106 ft., and has 5½-in. pipe cemented to bottom. Top of cement is at 16,070 ft. Operators will test after conditioning and weighting down mud for several days.

Magnolia Petroleum Co. 1 Ship Shoal, State Lease 766, Block 72, Terrebonne Parish area, 8 miles south of Coon Point production and 8 miles out in the Gulf of Mexico, is at a total depth of 2,800 ft. and is running 9⅝-in. protection pipe. Projected depth is 13,500 ft.

Magnolia 1 State Lease 838, Block 45, Eugene area wildcat, 12 miles off the Iberia Parish shore, drilled shale in sidetracked hole just below 8,644 ft. It is a 12,000-ft. project. Hole was originally carried to a total depth of 12,615 ft. where it kicked while drilling and stuck the drill pipe. Cement was pumped in the hole and set plug at 8,374 ft. and sidetrack was made.

There were 16 new locations reported this week with 3 being wildcat starts, 1

each in Beauregard, Jefferson, and Plaquemines parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Lafourche Parish: New gas-condensate sand, Valentine field—The Texas Co. 1 Luke Guidrez, 51-17s-20e, top sand 11,036 ft., TD 12,780 ft., perf. 11,036-91 ft., IP: 25 bbl. condensate and 4,852,000 cu. ft. gas per day through 3/16-in. choke, GOR 194,500, TP 3,850 psi., gravity 51.4°, no water.

SOUTH LOUISIANA WILDCAT FAILURE

Calcasieu Parish: Chicago Corp. 1 W. G. Gayle, 11-11s-8w, 2 miles east of South Lake Charles discovery gas-condensate production, 4½ mi. W of Holmwood townsite, dry, TD 10,556 ft.

SOUTHWEST TEXAS

Bastrop County Discovery To Be Completed on Pump

CORPUS CHRISTI.—J. E. Smith 1 Caldwell, wildcat discovery well in Bastrop County, 5 miles north of Cedar Creek and 1½ miles southeast of the Travis-Bastrop County line, is swabbing, after having filled up with oil. Operators will put on pump for completion. It is estimated to be good for 50 to 60 bbl. per day. Total depth is 1,645 ft., with 5½-in. casing at 1,598 ft., testing open hole at 1,598-1,645 ft. in Serpentine, chalk and sand. This well is located in J. A. Navarro Grant, Abstract 53.

Cam Corp. 2 G. N. Olson, wildcat 5 miles northwest of Hebbronville and approximately 4 miles south-southeast of Cam field, in southwestern Duval County, in El Mesquite Grant, recovered 1 joint of oil and mud on 30-minute drill-stem test at 3,048-54 ft., with bottom-hole pressure 80 psi. open and 250 psi. closed. Total depth is 3,125 ft., with 5½-in. casing at 3,080 ft. Operators are now running production test.

A new gas pay for Boyle pool, Starr County, has been opened at Continental Oil Co. D-14 M. M. Garcia, in Survey 908. Drilled to a total depth of 4,518 ft., on potential gage the well flowed 1,750,000 cu. ft. of gas per day on open flow, with shut-in pressure 1,350 psi. Production is through perforations at 3,780-97 ft.

Coastal Refineries, Inc., and W. D. Kennard E-6 M. M. Garcia, in Survey 970, gaged 50 bbl. of oil per day through 5/32-in. choke, to open new oil pay in Kennard pool. Total depth is 4,275 ft., with perforations for completion at 3,903-09 ft.

There were 49 new locations for Districts 1 and 4, with 21 being wildcat starts, 4 in Duval, 2 each in Starr and Zapata, and 1 each in Aransas, Benders, Caldwell, Cameron, Dimmit, Edwards, Guadalupe, Hidalgo, Milam, Nueces, San Patricio, Uvalde, and Zavala counties. Three successful exploratory tests were completed in Starr County to open an oil pool, a new gas pay in Boyle pool, and a new oil pay in Kennard pool. Five wildcats were failures, 3 in Edwards and 1 each in Duval and Zapata counties.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Starr County: New gas pay, Boyle pool—Continental Oil Co. D-14 M. M. Garcia, in Survey 908, top pay 3,780 ft. "H" sand, TD 4,518 ft., perf. 3,780-97 ft., IP: 1,750,000 cu. ft. gas per day on open flow, shut-in pressure 1,350 psi., no water.

New oil pool "Coastal"—Coastal Refineries, Inc. and W. D. Kennard B-1 Luis Pena, Porcion 38, north of Sullivan City, 2 mi. N of Sam Fordyce field, top pay 5,750 ft., TD 5,850 ft., perf. 5,760-75 ft., IP: 39 bbl. oil per day through 7/64-in. choke, GOR 1,825, TP 188 psi., CP 2,300 psi., gravity 42.5°, no water.

New oil pay Kennard pool—Coastal Refineries, Inc. and W. D. Kennard E-6

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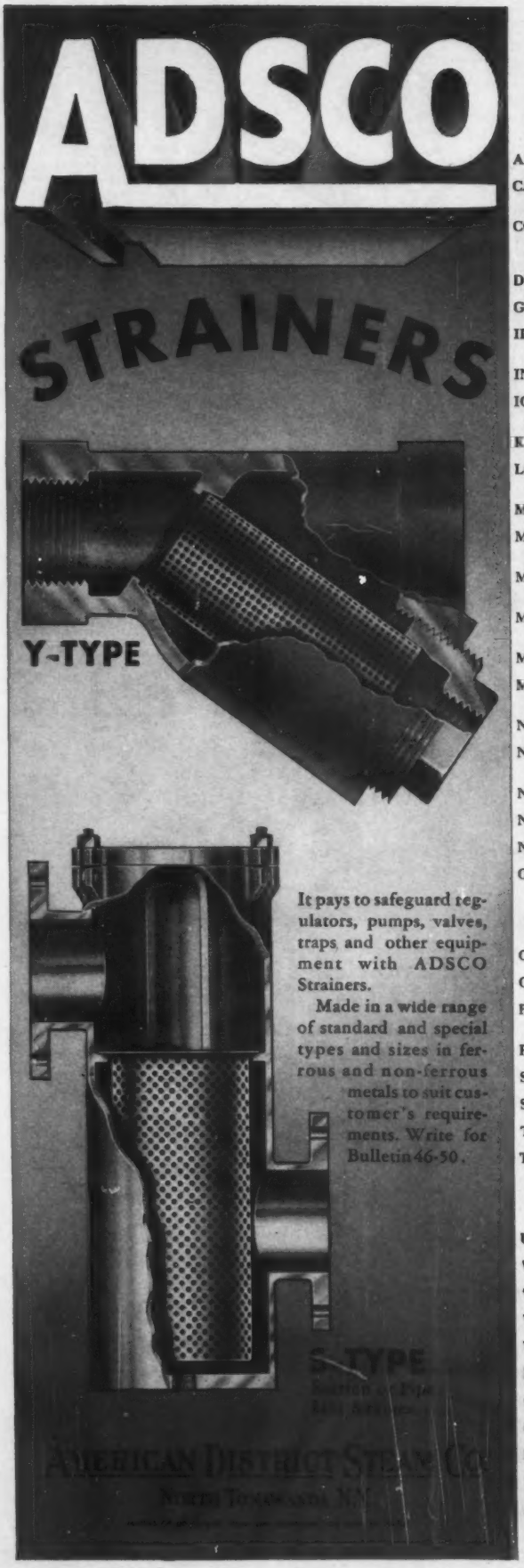
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M. M. Garcia, in Survey 970, top pay 3,903 ft., TD 4,275 ft., perf. 3,903-09 ft., IP: 50 bbl. oil per day through 5/32-in. choke, GOR 400, TP 175 psi., casing sealed, gravity 42.4°, no water.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Duval County: Gravis & Mitchell 1 J. F. Welder Hrs., Nathaniel Tinsley Sur. 103, 7 mi. E-NE of Freer, ½ mi. SW of Loma field, dry, TD 1,324 ft.

Edwards County: Brown & Wilborn 2 Eastland, in GC&SF Sur. 120, Block D, Wardlaw area, dry, TD 340 ft.

Brown & Wilborn 3 Eastland Ranch, GC&SF Sur. 120, Block D, Wardlaw area, dry, TD 318 ft.

M. T. Zemlach 2 Wardlaw Ranch, GC&SF Sur. 80, Block B, approximately 17 mi. from north line and a few hundred feet from west line of the county, dry, TD 510 ft.

Zapata County: George W. Graham 1 Avelino Guerra, Porcion 16, Share 5-B, 3 mi. NE of Falcon, dry, TD 3,218 ft.

LA.-ARK.

DeSoto Parish Test Recovers Distillate

SHREVEPORT.—Kerr-McGee and E. E. Hurley 1 Frost Lumber, 14-11n-15w, DeSoto Parish, was drilling ahead below 6,120 ft., after coring a show of gas and recovering distillate on a drill-stem test. The core, from 6,095-99 ft., recovered 1 ft. of shale and 6 in. of fairly tight lime with gas odor. Operators drill-stem tested from 6,088-99 ft. and in 23 minutes recovered 60 ft. of mud cut with distillate. There was no pressure. Sample tops released, on elevation of 221 ft., are: base of Massive anhydrite 4,965 ft., top of the James 5,480 ft., and Sligo 5,830 ft. The Travis Peak is expected around 6,500 ft.

In DeSoto Parish, The Texas Co. 1 F. J. Rambin, 23-11n-11w, has apparently been given up as a Travis Peak prospect and operators were testing higher in the hole. Total depth is 8,080 ft., in the Travis Peak topped around 6,664 ft. Casing was set to 5,146 ft., drilled out to 5,130 ft. and perforated at 5,094-5,120 ft. After acid treatment it tested acid water and salt water.

Carter Oil Co.'s 1 Martin Matthews, deep test in 22-18n-4w, Lincoln Parish, had further prospects of production this week when cores and tests showed some distillate. Cores at 9,706-16 ft. recovered 6 ft. of hard, tight sand, with slight distillate odor and fluorescence. A drill-stem test from 9,706-16 ft., using ¼-in. chokes and 2,900 ft. of water cushion, produced a slight blow for 20 minutes and in 1 hour recovered the water cushion plus 25 ft. of distillate and gas-cut mud. Operators were drilling ahead below 9,764 ft. It entered the Cotton Valley formation around 9,050 ft.

Continental Oil Co. 1 Pardee Co., 30-12n-6w, 12 miles southwest of the Calvin field, Natchitoches Parish, was drilling below 10,559 ft. in the Travis Peak. Data on electric log run to 10,131 ft. has not yet been released. In Ouachita Parish, The California Co. 2 Maxey, 32-18n-1e, set 10¾-in. casing to 1,833 ft. It is a new 9,600-ft. wildcat operation 5 miles southeast of the Tremont field.

In Union Parish, Pan-American Producing Co. 1 J. H. Albritton, Cotton Valley test 8 miles south of Farmerville in 10-19n-1e, had sand with shows of oil in returns around 7,230-40 ft. Cores at 7,240-48 ft. recovered 3 ft. of oil sand and 5 ft. of shale. A drill-stem test from 7,213-48 ft., using 600 ft. of water cushion, recovered 270 ft. of the cushion, 540 ft. of gas-cut mud, and 1,890 ft. of salt water and gas-cut mud with a show of oil. Flowing bottom-hole pressure was 1,496 psi., increasing to 2,788 psi. when shut in. Operators drilled ahead below 7,370 ft.

In Arkansas, Taylor & Kirby 1 Moore

estate was drilling at 3,220 ft. It is a new operation in 29-9s-9w, Cleveland County. Carter Oil Co.'s 9,000-ft. wildcat, the 1 H. H. Gildon, 22-16s-27w, Miller County, was drilling below 2,400 ft.

In Union County, Sohio Petroleum Co. 1-B Annie Smith, 8-16s-17w, had total depth at 6,410 ft. in the Smackover. A drill-stem test from 6,375-6,400 ft., open 15 minutes, recovered mud and salt water. Sidewall cores were being made in the Cotton Valley at 4,533 and 4,534 ft., where drilling showed sand with oil saturation.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: M. T. Halbouth & Stanolind 1 Bolinger-Boyd, NE NE 30-23n-13w, dry, TD 6,395 ft., Massive anhydrite 5,167-5,373 ft., Pettit porosity 6,305 and 6,345 ft., elev. 306 ft.

Red River Parish: M. N. Stafford 1 fee, approximately C 11-13n-10w, dry, TD 2808 ft.

Winn Parish: Burden-Kemp & Hunter 4 Tremont, E½ NE SE 26-12n-2w, dry, TD 1,847 ft., had trace of oil.

ARKANSAS WILDCAT FAILURES

Lafayette County: McAlester Fuel Co. 1-A McDaniel, SW SW SE 2-16s-24w, dry, TD 4,570 ft., Midway 866 ft., Arkadelphia 1,356 ft., Nacatoch 1,512 ft., Tokio 2,516 ft., Eagleford 2,743 ft., Massive anhydrite 4,354-4,534 ft., Kilpatrick 4,534 ft., elev 325 ft.

Union County: R. M. Crabtree 1 J. C. Broyles, NE SE SE 2-18s-15w, dry, TD 2,250 ft.

Guy Mabee Drilling Co. 1 W. T. Hudson, NW SW 7-19s-13w, dry, TD 3,606 ft., Midway 1,610 ft., Arkadelphia 2,108 ft., Nacatoch 2,273 ft., Saratoga 2,426 ft., Glen Rose 3,063 ft., James lime 3,197 ft., Travis Peak 3,592 ft., elev. 276 ft.

MICHIGAN

Four Producers Are Completed in Michigan

SAGINAW.—Michigan oil operators reported nine completions for the week, getting four small producers, one a wildcat, and at the same time announced 10 new locations. All five of the dry holes were wildcats. The wildcat producer, the Ford Henry 1 Funk in Section 13, Salem Township, Allegan County, pumped and flowed 50 bl. a day after acidizing. But an offset, the P. K. Degenther 1 Howard, was a dry hole. Daily production from the three other producers was but 80 bbl. a day, 25 from a Deep River-Arenac completion, 25 and 30 from two Van Buren County wells, one in Bloomingdale Township, the other in Geneva.

Three of the new locations are in Allegan County, two in Bay, two in Tuscola, and one each in Gratiot, Kalamazoo and St. Clair counties.

MICHIGAN SUCCESSFUL WILDCAT

Allegan County: Salem Township: Ford Henry 1 Gerald and Louis Funk, SW NE SW 13-4n-13w, pump and flow 50 bbl., acidized; TD 1,599 ft., in Traverse limestone.

MICHIGAN WILDCAT FAILURES

Allegan County, Salem Township: P. K. Degenther 1 John and Eleanor Howard et al, NW SW SE 13-4n-13w, dry in Traverse limestone, TD 1,393 ft.

Arenac County, Turner Township: Basin Oil Co. 1 Winifred Smith, SE NW SE 29-20n-6e, dry in Dundee, TD 3,072 ft.

Isabella County, Fremont Township: Union Development Co. 1 Wallace W. Corser, SE SE SW 1-13n-8w, dry in Dundee, TD 3,705 ft.

Manistee County, Stronach Township: Byron MacCallum 1 Sands Lumber Co., SE SE SW 22-21n-16w, dry in Detroit River, TD 2,100 ft.

Mason County, Eden Township: Superior Oil Co. 1 Mabel L. Sipey et al, SE SE SE 26-17n-16w, dry and abandoned after producing 50 bbl., acidized, TD 2,416 ft.

MISSISSIPPI

Brookhaven Well Gets 206-Bbl. Initial Output

JACKSON.—California Co. 1 J. B. Arrington et al Unit 1, 2918n-7e, in Brookhaven field, Lincoln County, was completed for an initial production of 206 bbl. per day on pump, 8-10 per cent basic sediment and water, through perforations at 10,318-380 ft. Total depth is 10,426 ft., with 7-in. casing set at 10,421 ft. Following are tops: Wilcox 3,902 ft., Selma 8,296 ft., Austin 8,878 ft., Base Austin 9,272 ft.,' first sand 9,415 ft., Marine Tuscaloosa 10,056 ft., Lower Tuscaloosa 10,221 ft., oil sand 10,314-365 ft. and 10,367-381 ft.

In Adams County, Hodge-Vaughey-Big Chief Drilling Co. 1 Lewis Fry, wildcat west of La Grange field, encountered the Baker sand approximately 60 ft. below the water level for the field, and was drilled to total depth 6,234 ft. and completed as dry. There was approximately 100 ft. of thickening between top Wilcox and Baker zone.

In La Grange field proper, Hodge-Vaughey-Big Chief 1 Ralph De Marco Estate had top of Baker sand at minus 5,892 ft. by electric log, was drilled to total depth 6,212 ft. and was completed as dry.

The 10 new locations for Mississippi included 1 wildcat start in Leake County; 3 development well locations for Baxterville field, Lamar County; 2 in La Grange

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field, Adams County; and 1 each in Mallalieu field, Lincoln County; Pine Ridge field, Adams County; and Yellow Creek field, Wayne County.

MISSISSIPPI WILDCAT FAILURES

Adams County: Hodge-Vaughey-Big Chief 1 Lewis Fry, 87-7n-2w, dry, TD 6,234 ft. Ran electric log, tops: Cook Mountain 2,790 ft., Sparta 3,022 ft., Wilcox 4,237 ft., Baker sand 6,156 ft., Wilson sand 6,173 ft., Parker sand 6,196 ft.

Wayne County: Grubb & Hawkins 1 G. M. & O. R. R. Co., 15-8n-8w, dry, TD 7,718 ft. Ran electric log,tops: Eutaw 5,756 ft., Tuscaloosa 6,367 ft., Marine Tusaloosa 7,180 ft., Massive sand 7,510 ft.

FLORIDA WILDCAT FAILURE

Washington County: D. E. L. Byers 1 Alfred Brothers, 31-2n-13w, dry, TD 229 ft. Hit cavity at 172 ft.

OKLAHOMA

Lincoln County Gets New Prue Sand Discovery

FALCON-SEABOARD DRILLING CO. and Toklan Production Co. have what appears to be a new pool opener in Prue sand at 1 Yancey, SE SE NW 26-14n-3e, southeast of Sparks in Lincoln County. The pay sand was cut at 4,106 ft. and total depth is 4,119 ft. A 6-minute drill-stem test at 4,108-19 ft. had gas immediately and recovered 115 ft. of oil and 15 ft. of oil-cut mud. Falcon-Seaboard opened a new Wilcox pool at 1 Bierman, NE NW NE 30-13n-5e, last month and the 1 Yancey had been scheduled as a Wilcox test but will probably be completed in the Prue.

Jordan Petroleum Co. 1 Faver, SE SE SE 8-15n-13, northeast of the Coon Creek pool in Logan County, on a drill-stem test of the Bartlesville sand, flowed 5 bbl. of oil per hour and recovered 375 ft. of clean oil. Casing was set at 5,008 ft. and total depth is 5,018 ft.

Continental Oil Co. deepened an old oil producer, 3 Hubbard, NE NE NW 12-26n-2w, in the Hubbard pool of Kay County to get production in the Arbuckle. Drilling from the old bottom of 2,976 ft. to 3,708 ft., operator set casing at total depth and perforated with 100 holes at 3,667-3,700 ft. Well flowed 154 bbl. in 24 hours through tubing. The Hubbard field was opened in 1924 with production from Tonkawa and Layton sands with production from the Wilcox added a few years later.

Texas Gulf Producing Co. 1 McBride, NE SE SW 32-4n-2w, Garvin County, has Bromide sand production in the Maysville South pool. Well is reported to be flowing 200 bbl. per day from pay at 6,669-74 ft.

Republic Natural Gas Co. has what appears to be the opener of the sixth pool in the Antioch area at 1 Loy C. Masters, SE NW SW 25-3n-3w, Garvin County. Well flowed at the rate of 30 bbl. per hour for 4 hours on a drill-stem test of the Gibson sand at 7,076-7,101 ft. The Masters discovery is west of the Southwest Antioch field but may be separated from the field by a fault zone.

OKLAHOMA SUCCESSFUL WILDCATS

Hughes County: H. T. & M. 1 Meadors, NE SE NW 18-9n-11e, gaged 2,398,000 cu. ft. of gas from Cromwell at 2,978-3,008 ft., TD.

Pottawatomie County: Brown 1 Hibbard, SE SW SW 21-6n-4e, pumped 5 bbl. of oil per day from Wanette at 3,080-90 ft., TD 3,746 ft.

Stephens County: Winkler 2 Martin, NE SE SE 11-1s-4w, pumped 74 bbl. of 30°-gravity oil per day from Springer sand at 3,872-5,004 ft., TD 5,334 ft.

OKLAHOMA WILDCAT FAILURES

Cleveland County: Morgan 1 Harris, SW NW NE 29-9n-3w, dry, TD 9,053 ft., Oswego 7,774 ft., Skinner 8,155 ft., Burgess 8,276 ft., Mayes 8,517 ft., Woodford 8,627 ft., Haragan 8,780 ft., Chimney Hill 8,994 ft., Sylvan 9,042 ft.

Cotton County: Halliburton 1 School Land, SW SE SE 6-1s-10w, dry, TD 2,455 ft., no tops reported.

Slemaker 1 Sultan, NE NE NW 22-3s-12w, dry, TD 2,010 ft., no tops reported.

Garvin County: Phillips 1 Tarrant, C NE NE 20-2n-2w, dry, TD 8,257 ft., no tops reported.

Hughes County: Phillips 1 Rilda, SW SW SW 1-7n-10e, dry, TD 2,700 ft., Booch 2,460 ft., Hartshorne 2,610 ft.

Kingwood 1 Buckner, SW NE NW 12-7n-10e, dry, TD 2,717 ft., Hartshorne 2,668 ft.

Lincoln County: Berry 1 Davis, SW SW 31-12n-3e, dry, TD 5,950 ft., Viola 5,727 ft., Wilcox 5,845-55 ft., second Wilcox 5,913 ft.

Noble County: Mohawk Drilling 1 Schmaltz, SE NE NW 24-21n-2e, dry, TD 4,496 ft., Cushing lime 713 ft., Deer Creek 1,290 ft., Hoover 1,550 ft., Tonkawa 2,220 ft., Layton 2,910 ft., Prue 3,830 ft., Skinner 3,860 ft., Red Fork 4,010 ft., Mississippi lime 4,250 ft., Woodford 4,340 ft., Sylvan 4,395 ft., Viola 4,440 ft., dolomite 4,435 ft., Wilcox 4,445 ft., second Wilcox 4,490 ft.

Okfuskee County: Elm Oil 1 Palmer, SE NE SW 17-11n-11e, dry, TD 2,910 ft., Gilcrease 2,500 ft., Cromwell 2,880 ft.

Oklahoma County: Harper 1 Whitt, NE NE NE 24-12n-2w, dry, TD 6,466 ft., no tops reported.

Pawnee County: McIntyre 1 Decker, SE SE SW 31-21n-6e, dry, TD 3,401 ft., Oswego 2,785 ft., Prue 2,974 ft., Skinner 3,135 ft., Bartlesville 3,254-94 ft., Mississippi lime 3,380 ft.

Pontotoc County: Eagan 1 Johnson, NE SW SE 26-5n-6e, dry, TD 1,965 ft., Calvin 1,092 ft., Senora lime 1,340 ft., Senora

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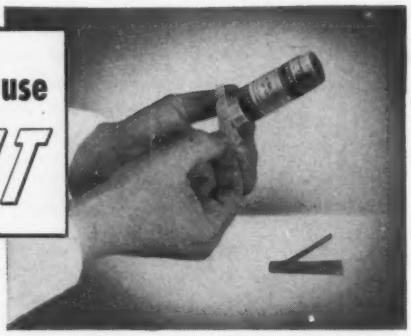

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sand 1,351 ft. with a show of oil, Thurman 1,526-42 ft., Boggey 1,560 ft., Cromwell 1,890 ft.

Seminole County: Phillips 1 Richards, SE NE SE 3-6n-5e, dry, TD 3,113 ft., Senora 2,603 ft., Earlsboro 2,844 ft., Cromwell 3,040 ft.

Emrich 1 Jackson, SE NE SW 16-6n-7e, dry, TD 1,444 ft., no tops reported.

Stephens County: Maxine 1 Green, SE SE NW 21-2s-4w, dry, TD 2,510 ft., sand 357-72 ft. and 471-89 ft.

Kingwood 1 Tillerson, SW SW NW 14-1n-9w, dry, TD 2,693 ft., Pontotoc 1,500 ft., Hoxbar 1,913 ft., Arbuckle 2,645 ft.

KANSAS

Sedgwick County Wildcat Hits in Mississippian

LEO WENTWORTH and C. D. Flournoy have production from the Mississippian at 1 Chambers, SE SE SE 10-29s-2w, Sedgwick County. Production, estimated at 250 bbl. per day after acid treatment, is from the Mississippian topped at 3,535 ft. Casing was set to 3,540 ft. and total depth is 3,546 ft. Well is located about 1½ miles north of production in the Clearwater pool where the pay zone is the Lansing.

Phil-Han Oil Co. 1 Hufford, SW SW NW 33-21s-13w, Stafford County, as the 26th pool opener for the year, made 368 bbl. per day from the Arbuckle at 3,755-70 ft. Well is located about 1½ miles southwest of the Gates pool.

In Ellis County, Texas Co. 1 Staab "A," NW NE SW 16-13s-17w, swabbed 1 bbl. per hour after acid treatment of the Arbuckle, topped at 3,582 ft. Total depth is 3,611 ft. and perforations for the test were made at 3,586-94 ft. The well is about ¾ mile northwest of the Catherine South pool.

Shell Oil Corp. has staked a rank wildcat in Hamilton County, 1 Scott, SW NE SE 28-22s-43w, just east of the Kansas-Colorado line. The location is about 5 miles north and slightly west of Coolidge. The test is expected to go to about 7,000 ft. to evaluate what is locally reported to be a large structure.

Derby Oil Co. and Kiowa Drilling Co. 1 Tarrant, SW NE SW 15-25s-11w, appears to be a Viola lime pool opener for Stafford County. Viola was cut at 3,920 ft. and a 30-minute drill-stem test was run at 3,921-24 ft., recovering 30 ft. of oil and 60 ft. of oil and gas-cut mud. Casing has been set at 3,921 ft.

For the week, a total of 65 locations were recorded. Leading counties, based on the number of reported locations, were: Barton, 9; Butler, 8; Stafford, 7; and Rice, 6.

KANSAS WILDCAT FAILURES

Ellis County: Phil-Han 1 Johnson, NW NW NW 9-11s-18w, dry, TD 3,662 ft., anhydrite 1,354 ft., Heebner 3,245 ft., Lansing 3,278 ft., conglomerate 3,545 ft., Simpson 3,616 ft., Simpson dolomite 3,627 ft., Arbuckle 3,644 ft.

Harvey County: Carl Hipple 1 Schrag, C E/2 NE SW 19-22s-2w, dry, TD 3,777 ft., Mississippian 3,145 ft., Kinderhook 3,460 ft., Misener 3,494 ft., Hunton 3,497 ft., Sylvan 3,563 ft., Viola 3,664 ft., Simpson 3,721 ft., Arbuckle 3,774 ft., no show.

Marshall County: H. J. Uhl 1 Marvin, NE NE NW 4-4s-7e, dry, TD 1,875 ft., Viola 1,830 ft.

Rooks County: B. & R. & Westgate-Greenland 1 Summerhauser, NE SE SE 26-6s-20w, TD 3,675 ft., Heebner 3,284 ft., Lansing 3,320 ft., Simpson sand 3,586 ft., Arbuckle 3,592 ft., Regan 3,663 ft.

Rush County: D. R. Locke 1 Anna Foster, SE SE NE 12-16s-20w, dry, TD 3,809 ft., Topeka 3,141 ft., Lansing 3,418 ft., conglomerate 3,711 ft., quartzite 3,807 ft.

Russell County: Musgrove Petroleum et al 1 Boedeker, NW NW NE 27-11s-15w, dry, TD 3,330 ft., anhydrite 855 ft.,

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CANADIAN FIELDS

Wildcat Near Leduc Finds Water, to Deepen

CHATHAM. — An important exploratory test on a seismic high 11 miles south and east of Leduc field, Imperial-Eyot 1, LSD 2, 28-48-25w4, found sulfur water in the D-2 zone of the Devonian, where drill-stem test at 5,311-353 ft. gave a 600-ft. rise of gassified water. The well is deepening to test the D-3 zone.

Leduc.—In Leduc field, Okalta-Leduc 2, LSD 10, 33-49-26w4, has proven production in both the D-2 and D-3 zones 1½ miles south of previous producers. Following commercial production in the D-2, the hole was deepened, penetrating the D-3 zone around 5,433 ft. for a thickness of around 10 ft. On drill-stem test it made 400,000 cu. ft. gas from the lower horizon with crude oil reaching the surface in 43 minutes. D-3 production will be taken, and a second well drilled for D-2 production. Though below the water level of the main Leduc field, Okalta 3 showed no water, and operators believe that instead of a continuous field, the Leduc, Woodbend, and Okalta discoveries may represent three different coral reef occurrences. An offset well is starting in LSD 9, 33-49-26w4.

Imperial 52, LSD 16, 20-50-26w4, on drill-stem test in the D-2 zone at 5,110 ft., gave 300,000 cu. ft. gas with oil reaching the surface in 12 minutes. Imperial 50, LSD 11, 35-50-26w4, is finishing a D-2 producer at 5,090 ft. Imperial 56, LSD 6, 34-50-26w4, is a D-9 producer at 5,318 ft. Imperial 51, LSD 6, 28-50-26w4, at 5,311 ft. got an oil rise in 50 minutes and is running 5½-in. casing. Several other wells are nearing completion, and three new locations have been made by Imperial, all in the north end of the field.

In connection with a hearing by the Alberta Conservation Board on allowables for Leduc field, J. D. Gustafson, chief engineer of Imperial Oil, urged that the 100-bbl. maximum for D-2 wells might be too high until steps were taken to return gas or water to the formation. Gustafson warned that in the near future some kind of lift might be required to get oil from the D-2 zone. At Edmonton, Frank Alexander, also of Imperial Oil; urged that gas wastage be forbidden and indicated that the company planned immediate construction of a $1,500,000 absorption plant so that gas might be returned to the formations.

Pincher Creek.—In the southern Alberta foothills, Gulf Canadian-Pincher Creek 1, LSD 15, 24-3-29w4, in the Madison limestone at 11,927 ft. is still drilling up a jammed packer preparatory to drilling to the lower zone of the Madison limestone. A definitive test before deepening was undertaken and gave 775 bbl. of 51°-gravity oil in 58 hours from the upper Madison. British Dominion Oil & Development Corp. of Calgary is arranging with a group of companies for a joint test on its holdings in the same general area.

Anglo-Canadian operations. — Anglo - Canadian Oil Co. of Calgary is undertaking important exploratory operations, in conjunction with other companies, in several parts of Alberta. Arrangements are being made with Shell Oil to drill in an area east of Turner Valley, following a geophysical survey which indicated encouraging structural condtions. In conjunction with Imperial Oil and Tower Petroleums, a geophysical survey is being undertaken southwest of Viking-Kinsella field, to be followed by drilling if results are satisfactory.

OHIO, KENTUCKY

Second Gas Completion Confirms Malta Play

COLUMBUS.—B. G. Bartley's second completion in the deep Malta play struck 1,250,000 cu. ft. gas in the Clinton sand and will not be taken down to the Medina as planned. The sand was topped at 4,696 ft. and drilled to 4,721 ft. Pressure is expected to reach 1,400 psi. Located on A. J. Mages, Section 23, Malta Township, Morgan County, the well is nearly 1 mile southeast of the discovery well, which is producing from the Medina sand.

The Fairfield Development 1 Mary Jones, Section 12, Newton Township, Munkingum County, ½ mile east of the ig Ford well, found 1,500,000 cu. ft. gas and a small show of oil in the Clinton at 3,800-838 ft.

Perry County again had a number of completions for the week. Richard Downing 1 W. K. Tharp, Section 24, Salt Creek Township, reached the Berea sand at 1,041 ft. and was drilled 9 ft. in, where it gaged 1,150,000 cu. ft. gas. The well is 1½ miles from the nearest Berea production. Ohio Fuel 5 Calvin Embrey, Section 22, Bearfield Township, gaged 178,000 cu. ft. in the Berea sand, 1,010,000 cu. ft. in the Clinton, and is being drilled on down to the Medina. The Clinton Oil 2 Myrtle Forsythe, Section 28, Madison Township, showed 1,200 ft. of oil when drilling at 38 ft. in the sand.

Of the 17 new locations reported for the week, 5 were in Ashland County, 4 in Stark and 3 in Perry. Lancaster field led in completions with 5 out of a total of 19.

OHIO SUCCESSFUL WILDCAT

Cuyahoga County, Parma Township: Rock Ridge Co. 1 George Hausheer, Lot 33, Clinto 3,074-3,120 ft., 1,300,000 cu. ft., TD 3,120 ft.

OHIO WILDCAT FAILURE

Wayne County, Sugar Creek Township: Ohio Fuel Gas Co. 1 J. H. Barkman, Sec. 2, Clinton 3,887-4,018 ft., TD 4,098 ft.

EASTERN KENTUCKY

ASHLAND.—Two dry holes were reported in Eastern Kentucky field during the week. Kentucky-West Virginia Gas Co. completed well No. 882, George Maynard, Pike County, dry at 3,627 ft., and well No. 5,781, Elbert Minnix, Magoffin County, dry at 2,474 ft.

WESTERN KENTUCKY

OWENSBORO. — Henderson County has prospects for a new Waltersburg producer at Carter Oil Co. 1 A. E. Melton, 14-O-23, north of the Cairo pool. A 2-hour drill-stem test of the Waltersburg at 1,745-61 ft. recovered 760 ft. of clean oil and 60 ft. of oil-cut mud. Operator is drilling below 2,219 ft.

In McLean County, Miller & Shiarella and Ashland Oil & Refining Co. 3 R. T. Tichenor, 20-N-27, Guffie pool, has been completed in the Jackson sand at 1,885-93 ft. for an initial production of 140 bbl. per day. Hole was drilled to 2,314 ft. and plugged back to 1,894 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Henderson County: Ashland Oil & Refining Co. 1 Fannie Royster, 11-O-23, IP 19 bbl., O'Hara, 2,502-11 ft., TD 2,546 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: Alvin N. Roth 1 T. Howard, 5-N-30, dry, TD 1,521 ft.

INDIANA

EVANSVILLE.—In the area northeast of Princeton, Ind., and about 2 miles west of the Kirksville pool, A. E. Morrison is setting casing to test at 1 H. Haper Heirs, NW NW NW 34-1s-10w, Gibson County. A 1-hour drill-stem test of the McClosky at 2,025-30 ft. had gas in 40 minutes and recovered 100 ft. of oil and 200 ft. of oil-cut mud.

Ashland Oil & Refining Co., J. Buchman, and C. E. O'Neal 1 E. Stockfleth, SW SW NW 24-5s-12w, Posey County, is plugging back to test the Cypress at 2,351-59 ft. after a 70-qt. shot resulted in oil and water. The Waltersburg at 1,865-1,935 ft. has not been tested.

Casing has been set to 2,675 ft. at George S. Engle 1 George T. Johnston, SW NE SE 17-6s-11w, Vanderburgh County, to test oil shows in the O'Hara at 2,524-29 ft. and in the McClosky at 2,604-08 ft. Total depth is 2,680 ft.

INDIANA WILDCAT FAILURES

Posey County: George & Wrather 1 W. A. Wilson et al, SE NW SE 34-5s-13w, dry, TD 2,950 ft.

Pike County: Clarence Wood 1 George H. Ward, NE NE SW 18-1s-7w, dry, TD 1,557 ft.

ROCKY MOUNTAIN

Wildcat Shows Spur Wind River Activity

DENVER.—Reports of additional oil in the West Poison Spider wildcat at 1 Unit, C NW SE 11-33n-84w, by Pure Oil Co. have again increased leasing activity in the eastern section of the Wind River Basin. This well is now drilling below 14,270 ft., and it is reported that shows of oil and gas had cut the mud considerably. The operator will continue drilling through this section and may then make tests of the zone. No report was made of formation tops and it is believed the well may still be in the Frontier formation. Two weeks ago the operator encountered saturation in a sand topped at around 13,800 ft. and 7-in. casing was run to 13,791 ft. No tests were made of the saturated zone and drilling was continued to the present depth. The well is the deepest ever drilled in the Rocky Mountain region, and location was based on seismic surveys made by Pure during the past year.

Continental Oil Co.'s first deep test of Little Buck Creek field, east of the Lance Creek pools, has found saturation and recovered some oil on test of the Converse (Minnelusa) sand. The well is 12 ELCU"B," NW NE SE 26-36n-64w, Niobrara County, located high structurally on the Dakota formation. The well topped the Converse at 5,195 ft. and the Converse sand was found at 5,209 ft. On drill-stem test 5,206-5,249 ft. the well made 540 ft. of 18°-gravity oil in 45 minutes. Continental is now drilling below 5,310 ft. and will test the Leo sand, productive at Lance Creek, before completing tests in the Converse. The company now has 13 Dakota sand producers in the field, with a daily production of 1,500 bbl. of oil.

The Texas Co.'s second Adon test, ½ mile west of the discovery well, is now drilling below 7,792 ft. with the top of the Dakota at 7,458 ft. At this point the well was at approximately the same structural level as the discovery well. The discovery well, first to find production in the central area of the Powder River Basin, produced at the rate of 250 bbl. of oil daily from the Minnelusa formation. The new test is 2 Unit, NE NW NW 2-52n-72w.

New operations.—There were 36 new locations in the Rocky Mountains this week, with 29 of the wells in Wyoming, 2 in Colorado, and 5 in Montana. In the Wyoming new operations a number of the wells are important wildcats, indicating that drilling activity in that state will reach an all-time high.

WILDCAT DISCOVERIES IN WYOMING

Torchlight, Big Horn County: Stanolind O. & G. 2 Orchard Unit, SW NE SE 24-51n-93w, 3,860 TD, PB 3,635, pumped 300 bbl. daily, acidized 4,000 gal. Muddy 850, Dakota 1,122, Fuson 1,176, Lakota

1,285, Morrison 1,345, Sundance 1,580, Gypsum Springs 1,952, Chugwater 2,011, Dinwoody 2,722, Phosphoria 2,792, Tensleep 3,040, Amsden 3,133, Madison 3,325, elev. 4,076 KB.

Pitchfork, Park County: Husky Refining Co. 5 Unit, NW NW SE 11-48n-102w, 4,470 TD, PB 4,355, pumped 200 bbl. daily, acid 1,000 gal. 14°-gravity oil. Sundance 1,815 Gypsum Springs 2,170, Chugwater 2,315, Dinwoody 3,322, Phosphoria 3,377, Tensleep 3,585, Amsden 3,759, Madison 4,219, elev. 6,721 KB.

WILDCAT FAILURES IN WYOMING

Squaw Creek, Fremont County: Fuerst Oil Co. 1 Cooley, SW SE SE 29-33n-100w, 1,500 TD, Tensleep 370, Lower Amsden 905, elev. 5,400 ground.

Powder River, Natrona County: E. R. McElroy 1 LaFleiche, C NE NW 23-36n-85w, 1,688 TD, first Wall Creek 1,133, second Wall Creek 1,506.

PERMIAN BASIN

Second Vealmoor Well Outproduces Discovery

MIDLAND.—Flush production in the second well of Vealmoor field of northwest Howard County greatly surpassed the discovery, and on the basis of a drill-stem test, would have an open hole potential of 450 bbl. an hour.

The new well, Seaboard Oil Co. of Delaware 1 Mrs. Dora Campbell, SW SE cection 29, Block 32, T&P Survey, ¼ mile north of Devonian Oil Co.'s discovery, the 1 Campbell, ran a third drill-stem test at 7,812-46 ft., in Pennsylvanian limestone, using ⅝-in. bottom and ¾-in. top chokes. Gas showed at the surface in 5 minutes, mud in 8 minutes and oil at the end of 11 minutes. It was allowed to flow for 19 minutes, gaging 42½ bbl. of oil. Drill pipe unloaded another 31½ bbl. of oil and when broken down, yielded approximately 30 bbl. of oil, making the total recovery for the 30-minute test about 104 bbl. of oil. Gas-oil ratio was estimated at 1,200 cu. ft., and gravity of the oil at 42°. Open flowing pressure at the surface was 375 psi. Bottom-hole shut-in pressure rose to 3,400 psi. in 15 minutes.

The producing section has not been identified, other than being Pennsylvanian, but observers believe it to be the Strawn. The well is said to have a possible producing section 92 ft. thick, having run the first drill-stem test from 7,745-78 ft., which flowed 74 bbl. of oil in 1 hour. A second test, from 7,778-7,812 ft., recovered 90 bbl. of oil in 30 minutes.

An 8,000-ft. wildcat test 8 miles northeast of Big Spring in Howard County was announced this week. Robert W. Atha of Mount Pleasant, Mich., made location for 1 M. L. Musgrave, 330 ft. from south and east lines of northwest quarter, Section 9, Block 31, T&P Survey.

On the northeast end of the Dollarhide area of Andrews County, Pure Oil Co. and Humble Oil & Refining Co. A-6-E E. P. Cowden, Section 24, Block A-52, PSL Survey, found flush production in a cavern of the Fusselman section of the Silurian, from 8,545-58 ft. It was drilled to 8,560 ft., and with packer at 8,520 ft., a 2-hour drill-stem test flowed better than 127 bbl. of 41.2°-gravity oil in 1 hour, through ⅝-in. bottom-hole choke, and 1-in. surface opening. Casing was to be run for dual completion in the Devonian and Silurian. The well is the third in that area to find production in a cavernous section.

In the Benedum area of Upton County, Oil Carriers, Inc., 1 Max Pray-State, 3 miles northeast of the discovery, was drilling at 8,020 ft. Humble 1 Barnett, 3 miles north and slightly west of the discovery, was drilling at 7,305 ft. Republic Natural

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Gas Co. 1-E-A Barnett, 2¼ miles north, was drilling below 2,070 ft. Slick-Urschel Oil Co. 1 Standifer, southwest offset to the new field discovery, was drilling in shale at 6,578 ft.

New locations last week totaled 91, including 6 wildcats, in 19 counties. This compared with the previous week's total of 46 field and 7 wildcat starts. Pecos County received 3 wildcats, while Cochran, Crockett and Gaines counties had 1 each. New field wells, by counties, were: Hockley 21, including 12 in the Levelland area; Pecos 12, Scurry 7, Ector 6, Crockett, Garza and Winkler 5 each; Andrews, Cochran and Glasscock 3 each; Coke, Crane, Gaines, Hale, Howard and Reeves 2 each, and 1 each in Dawson, King and Mitchell counties. Week's completions in West Texas totaled 68, being 58 oil wells and 10 failures. Two oil discoveries completed, and 4 wildcats were failures, both included in the total.

WEST TEXAS (DISTRICTS 8 & 7-C) SUCCESSFUL WILDCATS

Cochran County: Anderson-Prichard Oil Corp. 1 Minnie S. Veal, Tract 8, League 114, Potter SCL Sur., 1½ mi. N extension of the Dean field, flowed 326 bbl. 32°-gravity oil a day on 1-in. choke, San Andres pay 4,920-59 ft., GOR 625 cu. ft., TD 5,038 ft., PB 4,995 ft., top San Andres 4,173 ft., elev. 3,784 ft.

Pecos County: Tentative name, Orient field —R. R. Herrell et al 1 W. C. Jackson-State, Sec. 102, Blk. 8, H&GN Sur., 1 mi. NW Pecos Valley Low Gravity field, flowed 66 bbl. 27.5°-gravity oil a day, pay sand 1,785-1,822 ft., elev. 2,422 ft., TD 1,826 ft.

WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Garza County: Ohio Oil Co. 1 Swenson Land & Cattle Co., Sec. 26, Blk. 2, H&GN Sur., 5½ mi. from north and 1¾ mi. from east line of county, dry, TD 7,976 ft., San Andres 1,554 ft., Glorietta 2,600 ft., Mississippi 7,634 ft., elev. 2,357 ft.

Hockley County: Ray A. Albaugh 1 Nellie DeLoache, Labor 16, League 77, Reeves CSL Sur., 4 mi. NW Whiteface, dry, TD 4,778 ft., San Andres 3,695 ft., elev. 3,645 ft.

Reeves County: Francis K. Campbell 1 Edgar Martin et al, Sec. 30, Blk. 57, PSL Sur., 16 mi. N Toyah, dry, TD 3,975 ft., Delaware sand 3,684 ft., elev. 3,268 ft.

Upton County: Gulf Oil Corp. 313 J. T. McElroy, 387 ft. from N line, 1,707 ft. from E line Sec. 197, Blk. F, CCSD&-RGNG Sur., deep test in McElroy field, dry, TD 6,035 ft., will be used for water-flood input well.

TEXAS PANHANDLE (DISTRICT 10) Wildcat Failure

Collingsworth County: S. D. Johnson and Acme Die 1 Starr, Sec. 96, Blk. 15, H&GN Sur., 1½ mi. S Lutie, 6 mi. SW Aberdeen, dry, TD 2,506 ft., dolomite 2,490 ft., elev. 2,156 ft.

SOUTHEASTERN NEW MEXICO

HOBBS. — In northeastern Lea County, Mid-Continent Petroleum Corp.'s 1-A Sawyer, deep wildcat in SW SE 27-9s-36e, was reported to have recovered some 6,000 ft. of 38°-gravity oil on a drill-stem test from 12,099-12,181 ft. The recovery was cut with mud and water, although the water was said to be from the drilling fluid or water blanket and not formation water. Tops reported are: San Andres 4,110 ft., Mississippian 10,120 ft., Devonian 11,560 ft., and Ellenburger 12,152 ft. Total depth is 12,214 ft. Operators of the well did not confirm any details.

Magnolia Petroleum Co. 1-A Santa Fe, SE SE 30-19s-36e, 4 miles southeast of Crossroads, continued swabbing tests of the San Andres. After acid treatment in open hole from 4,863-81 ft., it recovered 15 bbl. of oil and 50 bbl. of salt water in 24 hours.

Barnsdall Oil Co. 9 Alaska-Cooper, NE NE 12-20s-36e, deep test in the Monument area, was given up as dry after testing all zones showing oil, to the Ellenburger at 10,625 ft. Plugged back depth was 6,890 ft. There were a number of oil shows but each developed water. On an elevation of 3,568 ft., it logged the following tops: San Andres 3,760 ft., Glorietta 5,165 ft., Tubb 6,310 ft., Wichita Albany 6,910 ft., Pennsylvanian 7,980 ft., Devonian 8,460 ft., Montoya 9,680 ft., Simpson 10,002 ft., and the McKee at 10,304 ft.

Glorietta production in Monument field was assured a ¼-mile east extension at The Texas Co. 5 J. R. Phillips, SW SW 6-20s-37e. A drill-stem test from 5,654-5,725 ft. had gas at the surface in 5 minutes, mud in 31 minutes and oil in 33 minutes, flowing 29.6 bbl. of clean oil in 1 hour through ⅝-in. choke. Gas-oil ratio was 1,083 cu. ft. and gravity of the oil was 39°. Operators were drilling deeper.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Lea County: Nolen & Byrom 1 Turland, NE SE 28-20s-37e, dry, TD 3,904 ft. in lime.

Vickers Petroleum Co. 1 Stanolind-State, SW NW 14-16s-32e, dry, TD 4,839 ft., had 1½ bailers oil in hole in Grayburg sand 3,685-95 ft., anhydrite 1,260 ft.

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ILLINOIS

Passport Pool Gets Best Well To Date

MATTOON.—Gulf Refining Co. 1 Walter Phillips, NW SW SW 12-4n-8e, Clay County, is showing for one of the best wells in the Passport pool. Well has been completed in the McClosky lime at 3,009-16 ft. and 3,019-24 ft. After treatment with 5,000 gal. of acid, the well flowed and pumped 1,150 bbl. in 24 hours. Total depth is 3,105 ft.

The pool opener by Diamond Oil Exploration Co. at 1 Toliver-Woods Consolidated, NE SW NW 15-4n-7e, Clay County, continues on production test of the Cypress at 2,602-16 ft., while the 1 A. Murphy, SE SE SW 10-4n-7e, is cleaning out and testing the Cypress at 2,584-2,602 ft. The Murphy well is about ½ mile north of the Toliver-Woods Consolidated.

In White County, W. O. Allen 1 Hughes, SE SW NW 2-5s-9w, is drilling deeper after swabbing 1 bbl. per hour from the Tar Springs at 2,571-80 ft.

ILLINOIS SUCCESSFUL WILDCATS

Wayne County: Robinson & Puckett 1 A. Wood, C S½ NE NW 16-2s-8e, IP 225 bbl., Aux Vases, 3,188-3,202 ft., TD 3,202 ft.

ILLINOIS WILDCAT FAILURES

Fayette County: P. Doran et al 1 B. Beck, NW NW NW 21-9n-1e, dry, TD 1,837 ft.

Cumberland County: National Associated Oil Co. 1 C. McClain, NE NE SW 10-9n-7e, dry, TD 2,510 ft.

Effingham County: Inland Oil Co. 1 Hartke-Wright, SE SE SE 28-8n-5e, dry, TD 2,403 ft.

Central Pipe Line Co. 1 A. Overbeck, NE NE NE 32-8n-7e, dry, TD 2,781 ft.

Richland County: W. C. Vickery 1 H. E. Murray et al, NE SE SE 7-3n-10e, dry, TD 3,168 ft.

Bond County: W. H. Krohn 1 Whalen, NE NE NE 34-5n-2w, dry, TD 1,333 ft.

Wayne County: Magnolia Petroleum Co. 1 Talbert, NW SE NW 36-1s-5e, dry, TD 3,202 ft.

White County: Yingling Oil Co. 1 Armstrong, NE NW NE 34-4s-10e, dry, TD 3,240 ft.

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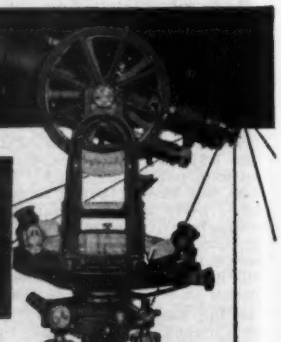

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First Quarter Completions Reflect Record-Breaking Trend

by Polly De Armond

OPERATIONS reported for January-February-March of the current year show a 14.1-per cent increase in total completions, and a 14.2-per cent increase in oil and gas wells over the same period of last year. There were 8,188 wells drilled, comprised of 5,379 oil and gas producers, and 2,809 dry holes which include 481 service wells. Total footage for the period was 28,999,092 ft., compared to last year's 25,424,568 ft. The average depth of wells did not vary between the two years. Rigs and drilling climbed 18.6 per cent to 13,163 for the three months of 1948.

First Quarter vs. Annual Totals

In past years, completions during the first quarter usually averaged 21.6 per cent of the year's total. The same records show that total footage for the first 3 months is generally slightly higher, or 22.3 per cent of the annual figure. If these ratios hold true in 1948, the yearly totals will be 37,900 wells and 130,000,000 ft. These figures compare favorably with the 36,700 wells and 132,000,000 ft. forecast by operators to The Oil and Gas Journal at the beginning of the year. *(See The Oil and Gas Journal January 29, page 152).*

Sectional Comparison

Several areas made significant gains over 1947. The most notable increases were in the Rocky Mountain region comprised of Colorado, Utah, Montana and Wyoming, where completions were up almost 55 per cent to reach 205, and footage increased almost 70 per cent for a total of 970,859 ft. The Texas - New Mexico area gained 550 wells, a 24.9-per cent increase over last year, with a 22.3-per cent gain in footage. The Southern area of Arkansas, Louisiana, Mississippi, Alabama, Georgia, and Florida recorded 623 completions, a 43.2-per cent increase over 1947, and a 20.6-per cent increase in footage. The Eastern district of New York, Pennsylvania and West Virginia reported 78 more wells than for last year, an increase of 6.9 per cent, with footage remaining about the same for both periods.

Pacific Coast completions increased 25.7 per cent to 621, but noted only a 6.4-per cent gain of 136,964 ft. in total footage. The North Central area of Ohio, Indiana, Kentucky, Illinois and Michigan added 74 more wells for a 6.3-per cent increase in completions, and 61,817 ft. for a small percentage gain in depth figures. Completions in Oklahoma and Kansas dropped 68, or 4.2 per cent, but total footage increased 4.2 per cent to reach 5,253,756 ft.

SUMMARY OF COMPLETIONS, MARCH 1948

	Comp.	Oil	Prod.	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	144	73	153	0	71	144	0	0	0	0	205,430	166
Pennsylvania	223	109	238	21	93	197	25	1	0	0	365,617	248
West Virginia	57	5	129	38	14	26	28	3	0	0	152,885	219
Ohio	199	36	611	40	43	49	69	1	0	0	337,821	186
Indiana	71	36	2,911	9	26	59	12	0	0	0	123,104	85
Kentucky	49	17	729	7	25	41	8	0	0	0	67,744	52
Illinois	105	62	5,085	0	43	45	60	0	0	0	260,657	202
Michigan	43	16	3,683	1	26	22	20	0	0	1	107,359	92
Kansas	173	101	30,393	13	59	28	143	2	0	0	550,668	365
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	0	0	0	11
Oklahoma	284	178	29,148	11	95	97	127	46	6	8	1,018,019	631
Texas	912	594	114,538	42	276	230	382	171	97	32	4,049,012	1,045
North	181	108	9,353	1	72	90	68	23	0	0	536,140	169
West Central	113	47	4,258	9	57	39	68	6	0	0	347,675	64
West	275	231	77,633	5	39	59	128	38	38	12	1,312,708	195
Panhandle	54	41	4,328	8	5	2	51	1	0	0	162,425	158
Eastern	49	31	4,457	5	13	4	14	17	13	1	297,836	72
Gulf Coast	116	65	7,927	6	45	7	26	35	30	18	785,655	200
Southwest	124	71	6,582	8	45	29	27	51	16	1	606,573	187
Louisiana	155	107	14,006	3	45	80	17	7	23	28	757,872	219
Northern	107	83	9,047	3	21	79	16	4	4	4	289,856	61
Southern	48	24	4,959	0	24	1	1	3	19	24	468,016	158
Arkansas	12	7	721	0	5	1	7	4	0	0	52,209	26
Mississippi	26	13	3,214	1	12	0	3	7	5	11	218,036	53
Ala., Ga., Fla.	2	0	0	0	2	0	2	0	0	0	6,419	8
Montana	17	13	886	0	4	0	15	2	0	0	48,638	65
Wyoming	23	17	4,182	0	6	2	16	3	2	0	101,370	112
Colorado-Utah	14	11	2,101	0	3	1	1	11	1	0	85,883	90
New Mexico	59	43	13,130	3	13	7	32	14	6	0	260,556	127
California	220	192	24,350	2	26	97	76	24	16	7	771,663	421
Total Mar. 1948	2,708	†1,630	250,208	191	°887	1,126	1,043	296	156	87	9,540,962	4,423
Total Feb. 1948	2,403	1,406	204,303	172	825	911	1,005	282	137	68	8,445,975	‡4,310
Total Mar. 1947	2,399	1,329	212,241	261	809	956	978	407		58	8,607,593	3,714

°Includes 170 service wells: N. Y. 71, Pa. 89, Ohio 8, Kans. 1, Tex. Panh. 1. †Includes 20 distillate wells: Okla. 4, E. Tex. 2, Tex. Gulf 6, No. La. 3, So. La. 4, N. M. 1. ‡Revised.

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED APRIL 24, 1948

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1948				
	Comp.	Oil	Gas	Dry	Footage	1948	1947	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	31	15	0	*16	37,122	494	414	0	0	0	0	0	0	0	0	0	0
Pennsylvania	46	21	3	†22	98,718	885	968	0	0	1	0	1	0	0	6	11	17
West Virginia	7	3	2	2	18,781	229	256	0	0	0	2	2	2	0	16	23	41
Ohio	23	9	5	‡9	64,759	385	390	0	0	1	1	2	1	0	7	11	19
Indiana	18	9	1	8	34,627	285	176	0	0	0	2	2	4	0	1	8	13
Kentucky	12	4	0	8	21,652	191	155	0	0	0	2	2	2	0	0	6	8
Illinois	38	20	0	18	100,749	579	603	1	0	0	8	9	11	0	0	100	111
Michigan	9	4	0	5	21,220	196	177	1	0	0	5	6	6	0	5	79	90
Kansas	53	29	5	19	172,083	792	794	0	0	0	6	6	9	0	1	98	108
Neb., Mo., Iowa	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Oklahoma	87	54	2	†31	311,658	1,158	1,272	2	0	1	16	19	40	3	8	187	238
Texas	233	147	11	75	880,279	3,340	2,650	7	1	1	34	43	94	9	35	594	732
North Central (Dist. 7-B & 9)	80	43	0	37	243,421	1,003	831	1	0	0	13	14	36	0	6	189	231
West (Dist. 7-C & 8)	68	58	0	10	289,010	905	624	2	0	0	4	6	14	0	1	66	81
Panhandle (Dist. 10)	11	5	5	1	33,337	185	136	0	0	0	1	1	0	0	1	5	6
Eastern (Dist. 5 & 6)	11	3	5	†3	63,563	173	155	0	0	0	1	1	4	0	0	44	48
Gulf Coast (Dist. 2 & 3)	32	15	0	17	208,741	523	503	2	1	0	10	13	25	8	8	134	175
Southwest (Dist. 1 & 4)	31	23	1	7	42,207	551	401	2	0	1	5	8	15	1	19	156	191
Louisiana	47	30	1	16	245,305	591	365	0	1	0	3	4	8	6	1	59	74
Northern	27	18	1	8	71,655	389	177	0	0	0	2	2	0	0	0	30	30
Southern	20	12	0	8	173,650	202	188	0	1	0	1	2	8	6	1	29	44
Arkansas	5	0	0	5	21,577	95	73	0	0	0	3	3	2	0	0	28	30
Mississippi	4	1	0	3	30,588	118	110	0	0	0	2	2	2	0	3	27	32
Southeastern States	2	0	0	2	11,938	14	15	0	0	0	1	1	0	0	0	12	12
Montana	3	3	0	0	7,987	72	52	0	0	0	0	0	1	0	0	7	8
Wyoming	9	7	0	2	37,441	118	68	2	0	0	2	4	7	0	0	15	22
Colorado-Utah	3	3	0	0	19,179	78	54	0	0	0	0	0	0	0	0	14	14
New Mexico	12	7	0	5	62,656	198	166	0	0	0	2	2	3	1	0	14	18
California	46	32	0	14	208,510	864	621	3	0	0	10	13	14	0	0	83	97
Total United States	688	398	30	260	2,406,829	10,682	9,381	16	2	4	99	121	206	19	83	1,376	1,684
Total previous week	718	418	57	243	2,381,137	9,994	8,816	14	0	7	85	106	190	17	79	1,277	1,563
Total April 26, 1947	565	335	50	180	2,084,608			19	0	0	58	77	205	25	46	1,135	1,411

Service wells included: *16, †1, ‡4.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED APRIL 17

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	838	2,045	215	1,160	1,512	24,301	4,526	8,631	7,664
Appalachian:									
District 1	95	271	54	67	84	2,188	185	329	297
District 2	61	206	16	65	118	1,044	117	174	89
Ind., Ill., Ky.	912	2,920	439	998	1,078	21,425	1,994	4,018	3,068
Okla., Kans., Mo.	446	1,466	217	494	500	10,228	619	1,695	1,369
Inland Texas	253	992	101	162	484	4,051	439	319	921
Texas Gulf Coast	1,369	4,165	727	2,143	1,775	18,692	1,208	5,021	5,392
La. Gulf Coast	417	1,265	395	532	560	5,548	1,167	2,106	1,240
N. La. and Ark.	83	218	70	116	139	1,981	352	446	137
Rocky Mountain:									
New Mexico	11	41	4	11	25	91	25	17	30
Other Rocky Mtn.	139	438	38	179	247	3,154	126	679	721
California	897	2,561	114	1,164	2,233	18,135	1,157	10,550	28,182
April 17, 1948	5,521	16,588	2,390	7,091	8,755	110,838	12,015	33,985	49,110
April 10, 1948	5,568	16,569	2,472	7,419	9,168	111,589	11,438	33,121	49,228
April 19, 1947	4,686	14,042	2,038	5,192	7,910	103,825	9,477	29,949	42,458

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 222,075,000 bbl. as of April 17—down 584,000 bbl. One year ago 234,051,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.		Pecos County, Texas (Yates)	2.35
East Texas	$2.65	Bradford, Pennsylvania	5.00
Kettleman Hills, California*	2.14	Eastern Ill. and Western Ind.†	2.77
Beauregard Parish	2.60	Tomball, Texas Gulf Coast	2.83
Illinois Basin	2.77	*37°-37.9°. †35° and above.	

TRENDS

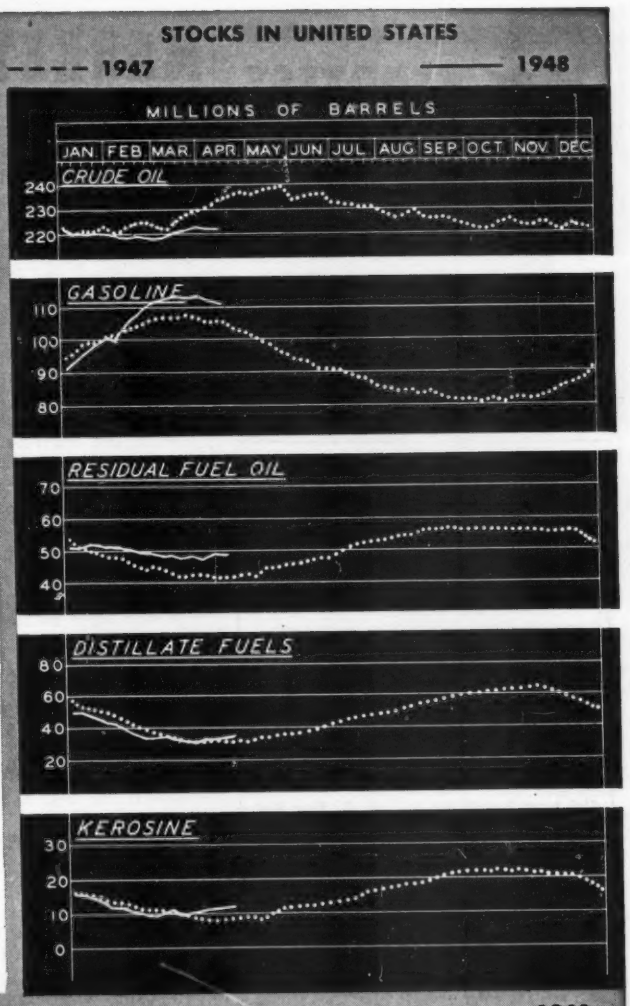
DAILY AVERAGE PRODUCTION FOR WEEK

	April 24 crude oil	B. of M. April demand	April 17 crude oil
Alabama	1,050	1,500	1,100
Arkansas	88,250	83,000	88,650
California	944,500	930,000	941,800
Colorado	44,030	48,000	43,940
Eastern	62,900	64,900	67,350
Florida	800	1,000	825
Illinois	171,500	178,000	170,700
Indiana	20,600	16,000	17,800
Kansas	300,700	304,000	297,850
Kentucky	24,900	26,000	24,000
Louisiana	482,250	475,000	481,050
North Louisiana	127,850	.....	126,650
South Louisiana	354,400	.....	354,400
Michigan	45,700	46,000	46,800
Mississippi	122,735	116,000	117,235
Montana	23,050	24,000	23,080
Nebraska	450	600	450
New Mexico	127,600	129,000	127,600
Oklahoma	409,400	415,000	404,300
Texas	2,419,000	2,450,000	2,419,000
Dist. 1 (Southwest)	25,800	.....	25,800
Dist. 2 (Southwest)	172,350	.....	172,350
Dist. 4 (Southwest)	253,400	.....	253,400
Dist. 3 (Gulf Coast)	493,300	.....	493,300
Dist. 5 (Eastern)	46,125	.....	46,125
Dist. 6 (Eastern)	121,400	.....	121,400
East Texas Field	316,500	.....	316,500
Dist. 7-C (West)	44,400	.....	44,400
Dist. 8 (West)	679,325	.....	679,325
Dist. 7-B (W. Central)	44,550	.....	44,550
Dist. 9 (N. Central)	137,600	.....	137,600
Dist. 10 (Panhandle)	84,250	.....	84,250
Wyoming	141,570	142,000	140,830
Total United States	*5,430,985	5,450,000	5,414,360
Change from prev. wk., up	16,625		

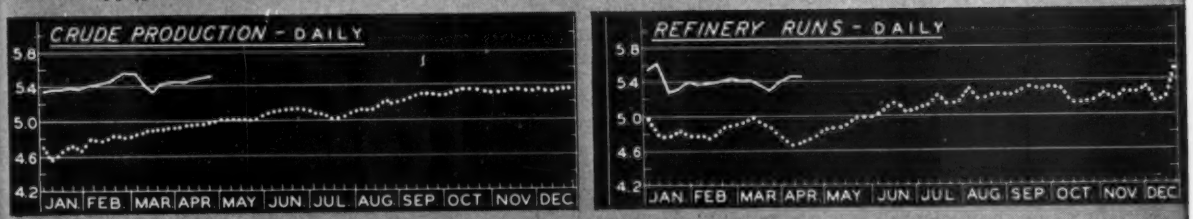
Total production January 1-April 24 ..... †622,892,970 bbl.
Same period last year (crude plus cond.).. 549,266,225 bbl.

*Not incl. 55,730 bbl. condensate. †Incl. 5,973,595 bbl. condensate.

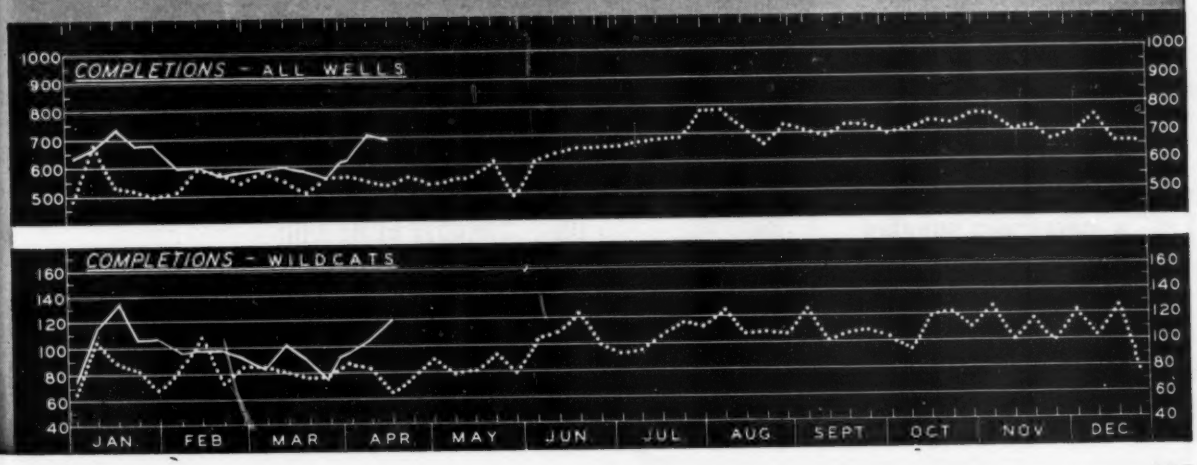
STOCKS IN UNITED STATES



DAILY OPERATIONS



WEEKLY COMPLETIONS



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MARKETS

IN the Mid-Continent area with tank cars no longer causing a serious "pinch" as has been the case in recent weeks, the big problem continued to be one of obtaining materials. Gasoline demand continued strong but shipments were not frequent on the open spot market. One marketer reported spot sales on this product as high as 14 cents, but this appeared to be exceptionally high as most quotations for spot movements ranged only up to 12½ cents, with not much of that being available.

With the increase by Ethyl Corp. (the first since 1942) in the price of antiknock compound, an immediate increase in premium gasoline was in sight. The price was increased from 49.482 cents per pound to 54.98 cents for the compound used in motor mix, and 60.478 cents per pound for aviation mix. One marketer reported that he expected this would result in about ¼-cent increase in the price of premium gasoline.

Demand for No. 2, although not nearly as strong as it was 1½ months ago, was holding a steady level last week, and demand continued. One shipment of No. 2 was reported last week at 10½ cents per gallon. Two months ago this product was moving at least 2 cents higher. Observers were of the opinion that No. 2 would not go much, if any, lower than the present price level. A great deal of the demand according to several sources was with storage in mind.

Kerosine was reported by one seller in the Mid-Continent area as being "somewhat slower."

A definite slowing up in demand for No. 6 was indicated. One seller said that although his movements of No. 6 had slackened off considerably in the past week he expects to see this product back in stronger demand within the next 2 weeks. The drop off by one seller was noted chiefly in shipments to the steel industry, which up to this time had maintained normal shipments of the product.

Some No. 6 with high sulfur content in the Mid-Continent area was moved at $2.40 per barrel, while No. 6 with low sulfur content moved at $2.50 per barrel.

In the New York Harbor area a continuing tight supply situation, which prevented major suppliers from offering products on open market, was reported. Some suppliers were reporting supplies "adequate" but not "ample."

Upstate New York and Canadian inquiries for summer stockpiling of heating oils in the past week were numerous.

Spot shipments of gasoline along the coast were scarce. Suppliers were holding on to their gasoline stocks in order to insure delivery to their regular customers. Spot buyers were indicating some reluctance to purchase material at the "high prices."

Prices generally remained unchanged along the Atlantic Seaboard.

Strengthening demand was improving the wholesale motor-fuel market on the Texas Gulf Coast last week. Material was reported moving 2-2½ cents over publication prices in open spot trading. Kerosine and distillate burning oils continued weak. Little material was said to be moving in the spot market for the barge and tanker trade. Distillate fuel oil prices were ranging around $2.75 a barrel.

Passenger cars of the United States in 1948 will need 1,370,000 bbl. of gasoline daily, an increase of 7.5 per cent over 1947, according to Russell E. Singer, executive vice president of the American Automobile Association, in a report to the National Petroleum Association last week.

Representative Quotations

Representative spot-market quotations of leading suppliers as of April 26, 1948. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	10½-11½	11.6-12* 10.5-12.2†	10.9-12½
Premium gasoline, 78-80 octane	11¾-12½	10.6-13.4	12.9-13¼
42-44 w.w. kerosene	9½-10½	10.2-12.2	10¼-10¾
No. 2 straw fuel oil	9½-10	9.3-11.1	9.05-10
No. 6 residual	$2.50-2.75	$3.03-3.90	$2.56-2.80

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	8½	8	8¼
Grade 18-55	10.2	9.6	9.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-14.5
750 vis., No. 3-4 neutral	15-17.25
2,000 No. 5-6 neutral	17-18½

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	30-33
200 vis. No. 3 neutral, 0-10 pp.	20-21

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	47
180 vis. p.t. neutral	45

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	7½

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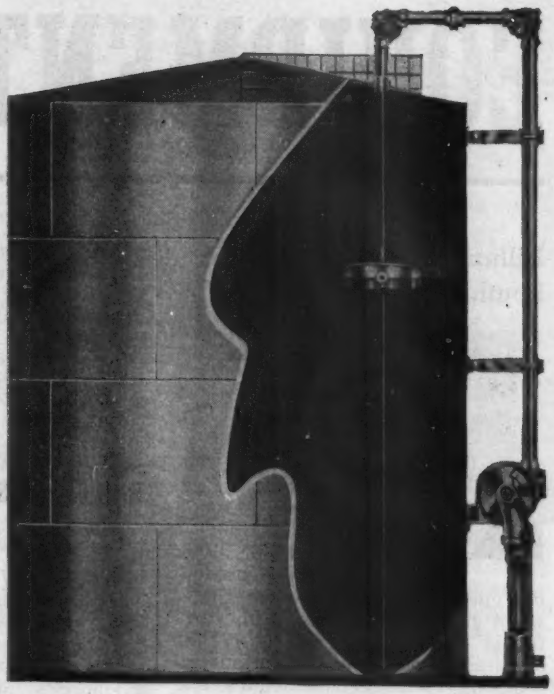

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The Figure No. 253 Gauge illustrated above can be installed on all types of gastight tanks with fixed roof operating under pressures up to 30 p.s.i. Other "VAREC" Approved gauges are manufactured for a variety of special requirements. High and low level alarm mechanisms are available for installation with these gauges. Also, a simple hand tester may be attached for ascertaining that the tape is taut and the float and sheaves are free at all times.

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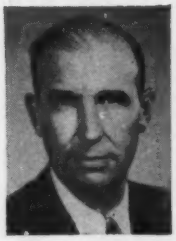
EQUIPMENT MEN ... in the News

Hilliard Planning Trip to South America



Ben Hilliard, manager of exports for Byron Jackson Co., is planning an extended trip to Latin America late this summer. Hilliard recently returned from a survey of West Coast oil-producing operations in the United States when he visited his company personnel as well as officials of the overseas departments of various oil companies. Venezuela, Colombia, and Peru will receive particular attention by this oil-export executive.

Price Elected National Tube Vice President

Edmund G. Price has been elected vice president in charge of operations of National Tube Co., according to John E. Goble, president. He succeeds E. N. Sanders, who becomes assistant to the vice president—engineering and operations, U. S. Steel Corp. of Delaware.

Price, a native of DuBois, Pa., was employed at the Lorain, Ohio, plant of National Tube in 1924, serving in various operating positions until 1931, when he became superintendent of blast furnaces there. He was appointed general superintendent of Lorain works in 1941, serving in that capacity until 1944, when he became an executive assistant in the operating department in National Tube's general offices in Pittsburgh. He was appointed general superintendent of the company's National Works at McKeesport in 1946, where he served until his election as vice president.

Ray Joins Economy Pumps As Special Consultant

Economy Pumps, Inc., Hamilton, Ohio, announces the appointment of H. R. Ray as special engineering consultant. Ray, who has an extensive background in the centrifugal pump field, will specialize in the chemical, refining, and process industries.

He comes to Economy Pumps from Manistee, Mich., where for the past 2 years he has operated his own consulting engineering firm. Previously he was associated with Dean Brothers, Indianapolis, where for 10 years he served in the engineering and sales departments of the centrifugal pump division. For 3 years prior to his association with Dean Brothers, he was general sales manager of the Manistee Iron Works, Manistee, Mich.

Durkee Heads Western Personnel Service

Rodney S. Durkee, president of Lane-Wells Co., has been elected president of Western Personnel Service of Pasadena, Calif. Durkee has been vice president for the past 5 years of this nonprofit research institute which supplies personnel guidance to 30 western universities and colleges. The institute furnishes a link between western industry and colleges.

Young Radiator Adds to Engineering Department

Two additions to the staff of the mechanical engineering department of Young Radiator Co., Racine, Wis., have been announced by F. M. Young, president of the company.

PAUL MORTENSON

J. A. McBRIDE

Paul Mortenson has been assigned to the contract products division as sales engineer. James A. McBride, industrial engineer, comes to the Young organization from Cord Corp. where he was coordinator of engineering and production, in which capacity he acted as special assistant to E. L. Cord.

Aall In New Position With Monsanto

Dr. Christian H. Aall has been promoted to the newly created position of field research technologist for Monsanto Chemical Co.'s plant at Monsanto, Tenn., R. R. Cole, general manager of the company's Phosphate Division, has announced.

Firm Gets Contract For Egyptian Plant

Chemical Construction Corp., Empire State Building, New York, has been engaged by Egyptian Fertilizer & Chemical Industries, Ltd., Cairo, Egypt, for the design and supervision of a calcium nitrate fertilizer plant near Suez, Egypt. Estimated cost of the plant is 19 to 20 million dollars.

Fluor Announces New Division

ERNEST MONCRIEF

A new division of The Fluor Corp., Ltd., to be called the Mid-Continent Gas-Gasoline Division, is to be set up with offices in the M. & M. Building, Houston, with Ernest Moncrief, manager in charge. This new division will be actively engaged in its new quarters May 1.

This division is to handle engineering, drafting, purchasing, and accounting, together with construction, using Fluor's regular field personnel, on gas-gasoline, cycling, and dehydration plants in the region east of the Rocky Mountains.

Along with Moncrief, the following Fluor personnel is being transferred, to complement and integrate the functions of this new division: J. L. Tathwell, engineering department; William F. Chapin, process department; Tom H. Hanks, accounting department; and C. E. Richardson, purchasing department.

Catalytic Construction Names New Officials

At the annual meeting of Catalytic Construction Co. held April 8, directors were elected exclusively from operating management. The following elections and appointments were made: Directors: John D. M. Hamilton, David N. Hauseman, W. Graham Jamison, Alan T. Knight, Harmon J. Monnik, Claude C. Peavy, and T. Ellwood Webster.

Officers include: David N. Hauseman, chairman of board; T. Ellwood Webster, president; Alan T. Knight, vice president; Claude C. Peavy, vice president; John D. M. Hamilton, sec-

(Continued on page 195)

n Galveston Bay, huge rotary drill-g rigs bore nine thousand feet under he sea for oil. Long strings of pipe put remendous shock loads on wire rope. RU-LAY Preformed stands up extreme-well even under such treatment.

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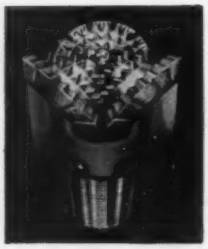
DRAKE WELL—*Col. E. L. Drake's "cable-tool" drilling rig of 1859 at Titusville, Pennsylvania, with which the first successful oil well was brought in by drilling operation.*

The Cavalcade of Oil

NUMBER FIVE OF A SERIES

The petroleum industry began its triumphant march on August 28, 1859, with the first successful attempt to drill the earth for oil. On that day, in Titusville, Pennsylvania, Colonel E. L. Drake viewed the successful results of his tireless effort and unshaken belief that oil could be brought to the earth's surface by drilling penetration. While production of the Drake well amounted to only 20 barrels a day, this modest beginning was the keystone on which was built the most gigantic world industry in modern history; for the problem of the ages . . . a method to find oil deep below the surface of the earth . . . was solved!



Significant in the progress of petroleum history are the great advances made in the drilling industry. Where Colonel Drake drilled three feet each day, modern drillers accomplish hundreds of times that amount of footage in a matter of hours. It was the invention of the rock bit by Howard Hughes, Sr., in 1909 that revolutionized the drilling industry and made possible penetration of any sedimentary formation and to depths of several miles below the earth's surface! HUGHES is proud of its part in petroleum's progress and is equally proud of the position HUGHES PRODUCTS hold in the field as being "WORLD STANDARD OF THE OIL DRILLING INDUSTRY."

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